WIRE ROPE

is a machine

J&L STEEL

JONES & LAUGHLIN
STEEL CORPORATION

J. E. Dolan
U of M
Oct 49

WIRE ROPE

JONES & LAUGHLIN
STEEL CORPORATION

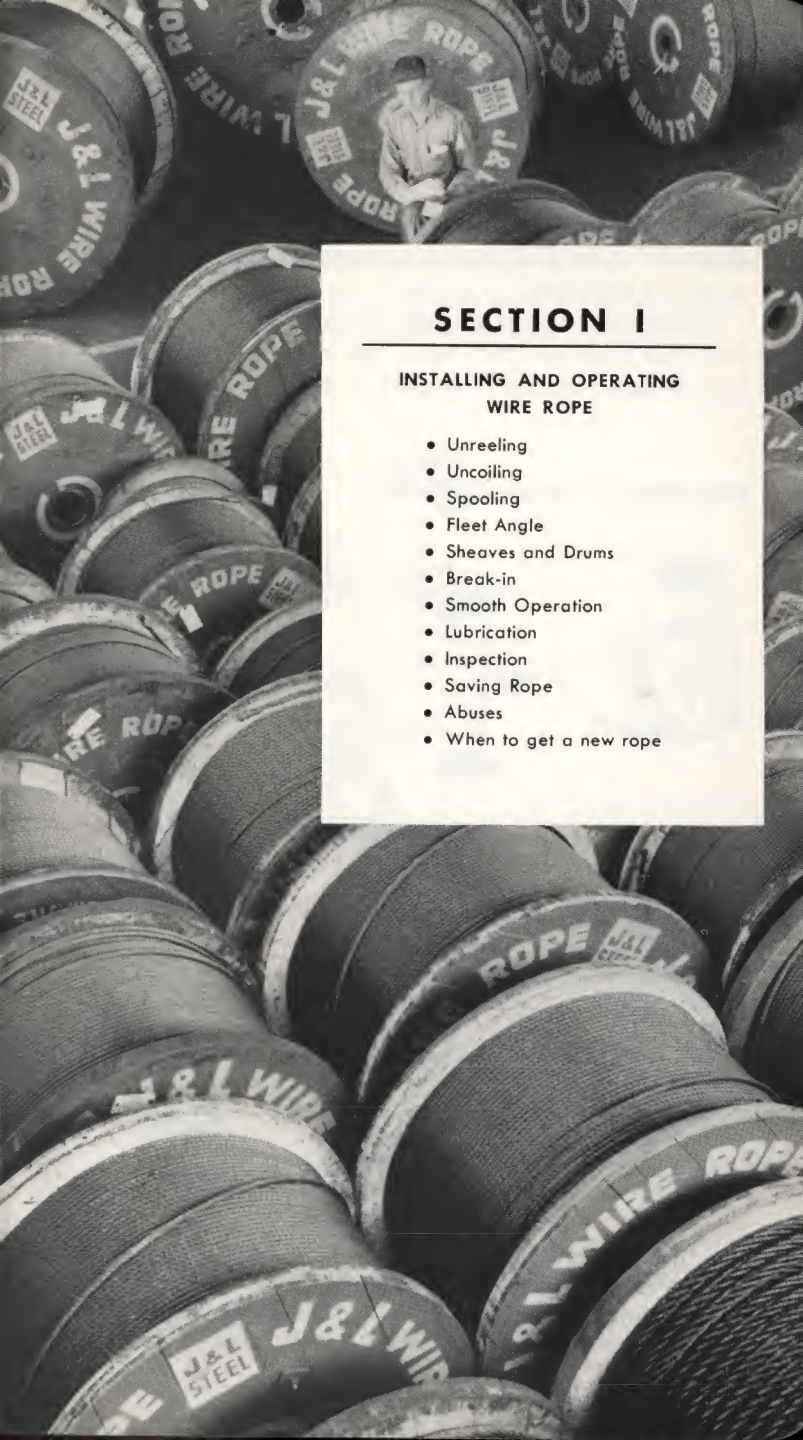
PITTSBURGH 30, PA.

DESIGNED BY WILLIAM M. PHILLIPS STUDIO

Printed in U.S.A. by The Republic Press

Form No. ADS 151

TABLE OF CONTENTS



SECTION I

INSTALLING AND OPERATING WIRE ROPE

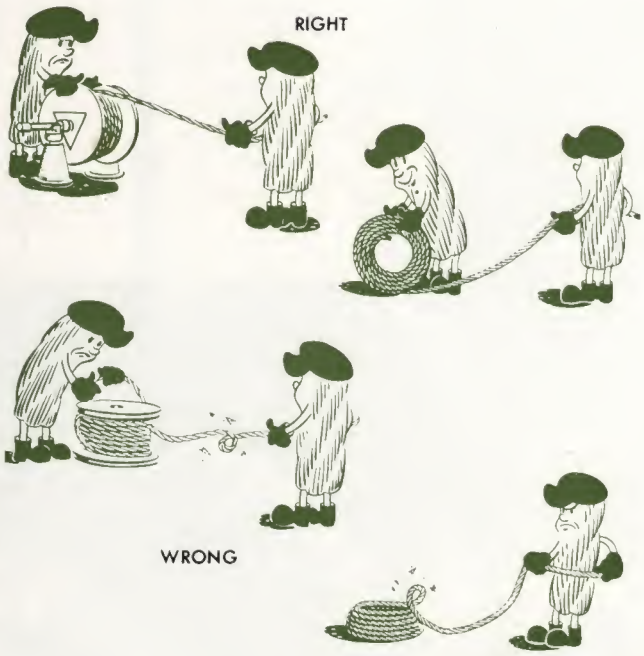
- Unreeling
- Uncoiling
- Spooling
- Fleet Angle
- Sheaves and Drums
- Break-in
- Smooth Operation
- Lubrication
- Inspection
- Saving Rope
- Abuses
- When to get a new rope

Installation

A lot of the service you get out of wire rope depends upon the way you install it and on the way it is operated.

Installation is particularly important, because if you don't get started right the rope will not last very long no matter how good it is.

Unreeling or Uncoiling

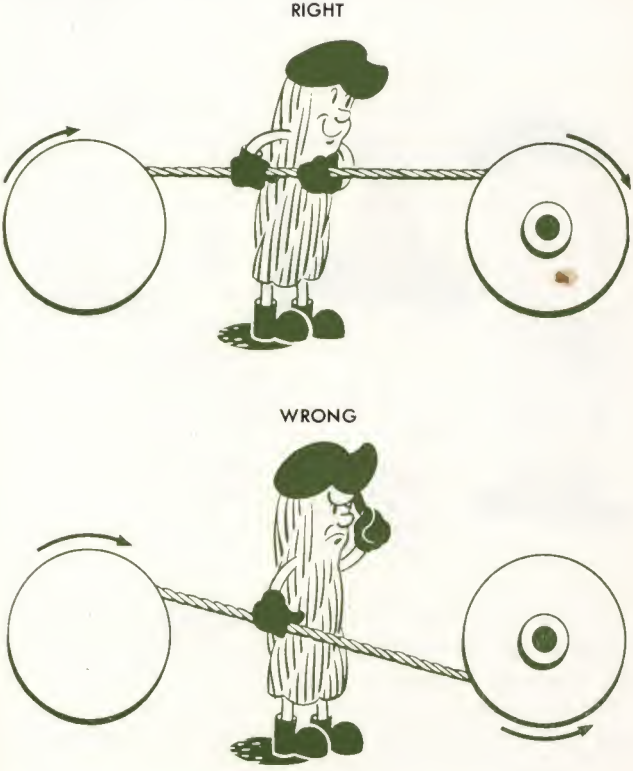


Be careful when unreeling or uncoiling wire rope. It might get *kinked* unless it is unreeled or uncoiled properly, and kinking leads to early rope failure.

Putting it on the Drum

Whenever possible, it is good practice to take the rope directly from the reel onto the drum.

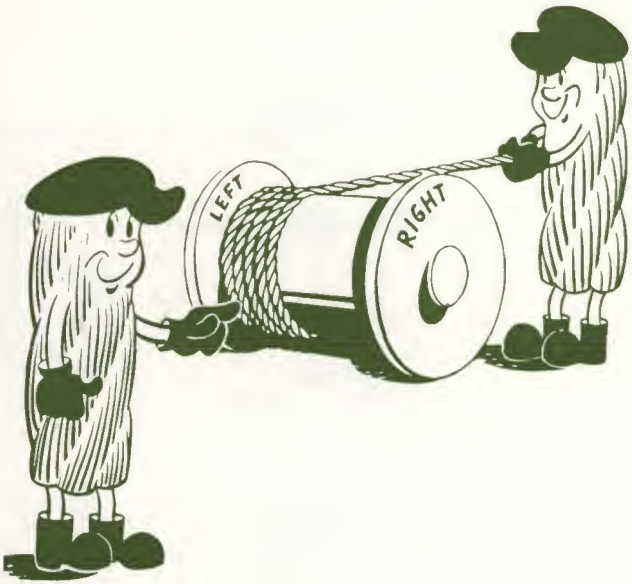
Always keep the same direction of bending when making this transfer, because reverse bending will injure the rope.



A lagged or a grooved drum will usually permit installation from one side and in one direction only. The rope conforms to the groove and is supported by it.

Spooling

When a smooth drum is in use, the wire rope must be correctly spooled to avoid kinking, pressing, wedging, and short rope life.



When wire rope is spooled on a smooth drum it tends to roll in the opposite direction from the lay. For example, a right lay rope rolls to the left.

A *right* lay rope spooling over the top of the drum should be started from *left* to right.

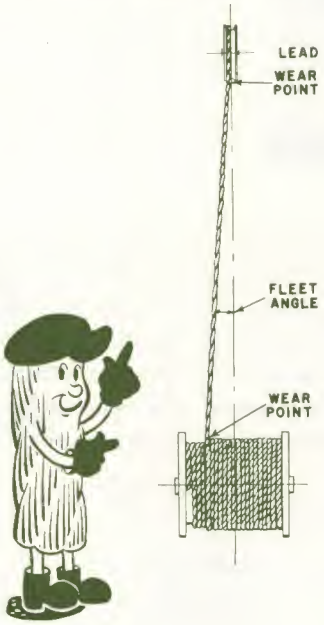
A *left* lay rope spooling over the top of the drum should be started from the *right*.

This keeps the coils firmly together and gives the proper support for each succeeding layer of rope.

Fleet Angle

Fleet angle is the angle the rope makes from the lead sheave to the drum flange.

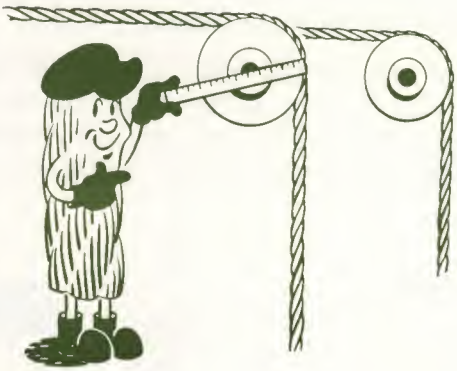
If this angle is too great (caused by the lead sheave being too close to the drum), the rope *scuffs* as succeeding coils go on the spool—and scuffing or rubbing means unnecessary wear and short rope life.



Years of experience have proved that the fleet angle should not exceed one and one-half to two degrees.

A safe angle can be obtained by allowing *at least* 30 feet of lead for each two feet of drum width, when the lead sheave is mounted on the center line of the drum.

Size of Sheaves and Drums



Wire Rope is built to transmit power around corners, but it must be guided by sheaves. These sheaves must be big enough to allow the rope to *bend* without *binding*. The drums used must also be big enough to prevent the rope from binding internally.

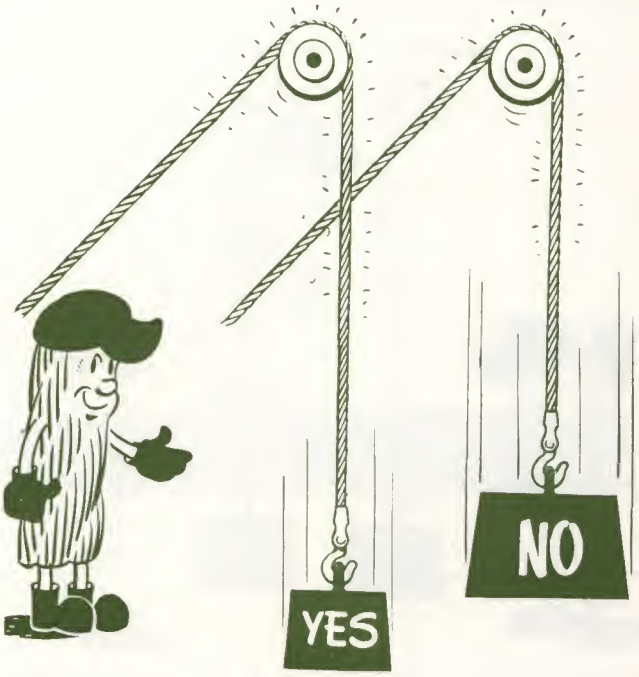
Recommended drum and sheave diameters for various constructions of ropes are as follows:

Rope Construction	*Recommended Diameter*	*Minimum Diameter*
6 x 7	72 times rope dia.	42 times rope dia.
6 x 19 Seale Patent	45 times rope dia.	30 times rope dia.
18 x 7	45 times rope dia.	30 times rope dia.
6 x 19 "U"	45 times rope dia.	30 times rope dia.
6 x 19 "W"	39 times rope dia.	26 times rope dia.
6 x 31	36 times rope dia.	24 times rope dia.
6 x 37 "D"	32 times rope dia.	21 times rope dia.
6 x 37 "F"	30 times rope dia.	20 times rope dia.
6 x 37 "A"	27 times rope dia.	18 times rope dia.
6 x 37 "G"	27 times rope dia.	18 times rope dia.
6 x 42	20 times rope dia.	13 times rope dia.
8 x 19 Hemp Center	32 times rope dia.	21 times rope dia.
8 x 19 "W" CenterFit	37 times rope dia.	25 times rope dia.
8 x 19 "K" CenterFit	42 times rope dia.	28 times rope dia.

Breaking it in

Any machine needs a breaking-in period, and wire rope is no exception.

A new rope may be easily damaged by any operating error.



A few trips through the working cycle at slow speeds and light loads will *set* the strands more firmly in place.

It will also give the operator a chance to see that the *drums* and *sheaves* are operating properly and are fitted to the new rope.

Smooth Operation

Skillful operation is necessary to establish good wire rope service records.

Some machinery is so automatic that the operator merely starts and stops it. But on most equipment using wire rope, the operator directly controls the rope and the rope life.

Sudden acceleration, shock loading, excessive vibration, are the indications of a poor operator.

The *smooth*, *steady* application of power is the mark of an experienced and able operator. Superintendents know that skilled operators *cut* rope and maintenance *costs* and *build* up *safety* on the job, and that's why they want the best men as operators.

Lubrication

Lubrication of wire rope is as vital as putting motor oil in an automobile.

The lubricant serves two purposes: it *reduces wear* and *protects the rope.*

When wire rope is in operation, the wires rub against one another. The outside wires also wear against the sheaves and drums. Lubrication will reduce wear both on the inside and on the outside of the rope.

Lubrication also protects the wires of the rope from corrosion and dirt. In hemp center ropes, it protects the fiber core from dry rotting and falling apart.

Lubricants in the Rope

J&L wire rope is thoroughly saturated with lubricant during manufacture. Fiber cores are soaked with it. Lubricant is applied in and around *every wire* of the strand, and again around *each strand* in the rope.

There are three types of lube put in J&L ropes. One is *petrolatum*—a clear thin penetrating lubricant. Another is *wire rope compound*, which is a grease having considerable body and used primarily to protect rope.

The third type is *Bronz-lube*, an exclusive J&L development.

Bronz-lube has an exceptionally high film strength to *prevent* it from *squeezing* out between rope wires under pressure. It contains small particles of soft bearing metal to reduce wear caused by internal friction when the rope is working under heavy loads and flexing over sheaves and drums.

Provided at no additional cost on J&L *Preformed Permaset* ropes and *CenterFit*, Bronz-lube is specially designed to give longer service life, reduce maintenance costs, and give better on-the-job rope performance.

Oiling the Rope

Lubricating wire rope in the field presents special problems. In the manufacturing process, the lube is applied hot to the separate wires and strands as they are formed into rope.

In the field, a lighter lubricant is required—one which will penetrate into the rope. It can be brushed on, poured on or applied in a bath when conditions permit.

Two important points of field lubrication are:

Clean the rope as thoroughly as possible before applying the lube.

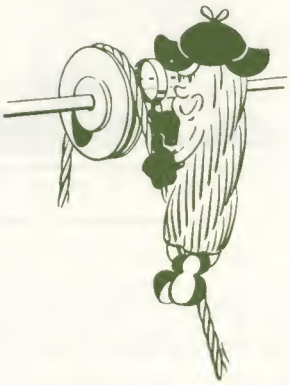
Give the lube as much opportunity as possible to soak in.

The frequency of application depends on the nature of the operation and can be determined by inspection. J&L wire rope engineers are available to assist you with your lubrication problems.

Inspection

Drums and sheaves should be inspected frequently.

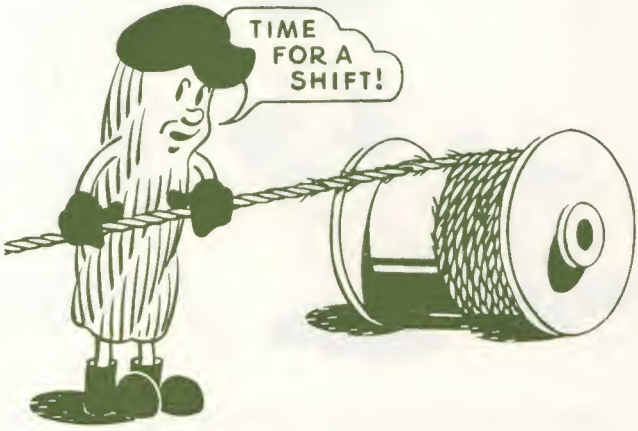
Scored drums and battered lagging will impair rope service. Worn filler and riser strips will cause kinking and improper cross-over.



Broken or scored sheaves will play havoc with the outer wires of the rope. Worn sheave guards may permit a rope to jump the sheaves and cause an expensive, and possibly dangerous accident.

These points are watched carefully by all good operators.

Shifting Wear Points



Certain sections of the wire rope often get more wear than others.

Rope on a drum with two or more layers will wear at the point where the rope starts each successive layer, and also at the points where the upper layer crosses the lower.

Crane ropes will fatigue at an equalizer sheave.

Hoist ropes will often fail from vibration fatigue at the point where they are dead-ended.

Because of these wear points, it is good practice to *move* the rope at *regular* intervals in order to *distribute* wear. Just like shifting tires on an automobile.

Here are a Few Tips

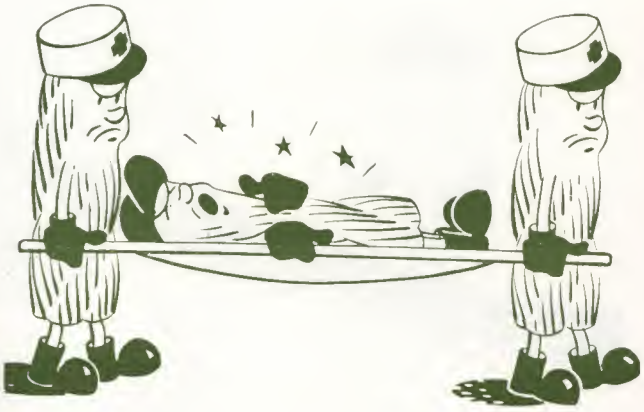
Change of layer and cross-over points can be moved by cutting a few feet of rope from the drum end and refastening. This cut should be of such length as to move the change of layer at least one full coil from its original position and enough to move the cross-over points approximately one-quarter turn around the drum.

A similar cut on the drum end of the crane rope should be long enough to move the static section on an equalizer sheave three sheave diameter lengths away.

Drag and slope ropes should be turned end for end when inspection shows the outer wires are worn one-third to one-half their diameter.

Vibrational fatigue can be eliminated by cutting off that section of rope next to the anchorage and refastening. The *exact length to be cut and the frequency* of cutting will be learned from operating experience.

What to Avoid



Kinking, which results in localized wear, is generally caused by allowing a loop to form in a slack line and then pulling the loop down to a tight permanent set.

Overloading, which results in complete fracture of the rope or crushing and distortion on the drums and sheaves, is caused simply by working the rope with a load too near its breaking strength.

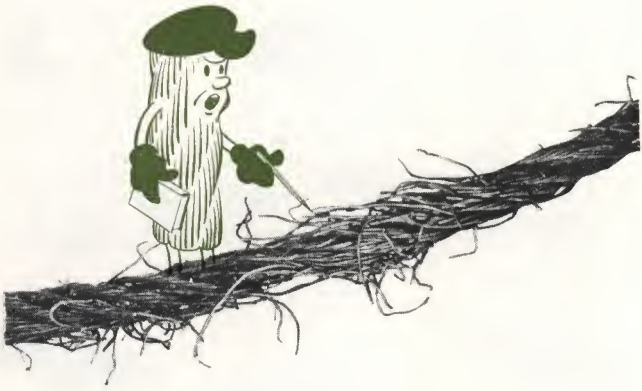
Dragging of the rope over a bank or some other obstruction will score it, causing localized wear.

Improper Seizing permits strands to become loose and unbalances a rope, throwing all of the load onto a few strands.

Improper Spooling results in crushed and distorted ropes and comes from careless application and operation of the rope.

Whipping a line, which results in many wires broken square off, comes from jerking the line or running it loose.

When to Get a New Rope



In some operations, the wire rope can be run to complete failure without injuring machinery or endangering life. But on many jobs rope failure is a *risk.*

Where risk is involved, it is desirable to estimate the remaining strength and service life of a worn rope.

A rope, like a chain, is only as good as its weakest point. Any estimate of condition is made at that point *showing the most wear.* The estimate is based on the number of broken wires in the rope lay and the condition of the remaining wires—for example, evidence of corrosion or nicking.

One way to arrive at a safe practice is to set an arbitrary *maximum number of broken wires* in any rope lay then remove the rope from service and run an ultimate strength test on the worn sample. The arbitrary figure can then be revised and rechecked until a *practical working guide* is found for the particular job. Our engineers will be glad to help.

SECTION II

SELECTING THE CORRECT WIRE ROPE FOR THE JOB

- Strength
- Flexibility
- Resistance to Abrasion
- Crushing Strength
- Dimensions
- Strands and Rope Construction
- Grades of Steel
- Fabrication
- Type of Core
- Lay
- Examples of Orders
- Where to Buy Rope

Selecting Wire Rope

Wire rope is a machine. It has many individual and closely related parts that move and operate in a certain predetermined way when the rope is in use.

Think of four things when selecting wire rope for the job:

STRENGTH

FLEXIBILITY

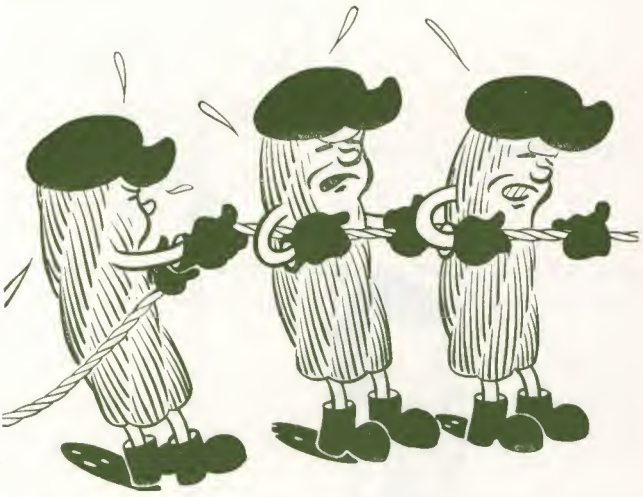
ABRASION RESISTANCE

RESISTANCE TO CRUSHING OR DISTORTION

The correct rope for the job will have the proper balance of these four qualities to meet the *requirements* of the job it must do. Each specific wire rope job has a specific type of rope best designed to do the work.

A rope with proper *balance* is selected after study and research into the job application shows which design will give the best performance during operation and the longest service life.

Strength



The correct rope for the job has enough strength to take care of the *maximum load*—plus a necessary *safety factor.*

Rope strength for the *maximum load* is readily determined from the size, grade, and construction of the rope.

The factor of safety is the ratio of the strength of the rope to the *working load.* It includes consideration of the speed of operation, acceleration, deceleration, length of rope, the number and size and location of sheaves and drums, rope attachments, conditions causing corrosion and abrasion, and the degree of danger to life and property.

It is never advisable to operate rope for general purposes with a safety factor less than *five times* the working load. Larger factors are desirable in many cases for greater safety and increased economy.

Flexibility

When a rope undergoes repeated bending during its service, a construction is required which will permit bending without the individual wires breaking from fatigue.

Resistance to fatigue in wire rope improves as its flexibility increases. Two things increase flexibility:

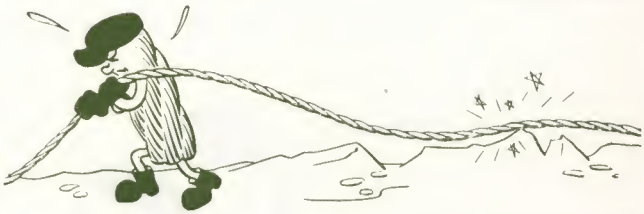
SMALLER WIRES

PREFORMING

Ropes built with *smaller* and more numerous wires are more flexible than ropes with large wires.

J&L Permaset preformed ropes are built so that the only stress from bending is caused by the bending operation itself. All other stresses have been relieved by preforming.

Abrasion Resistance

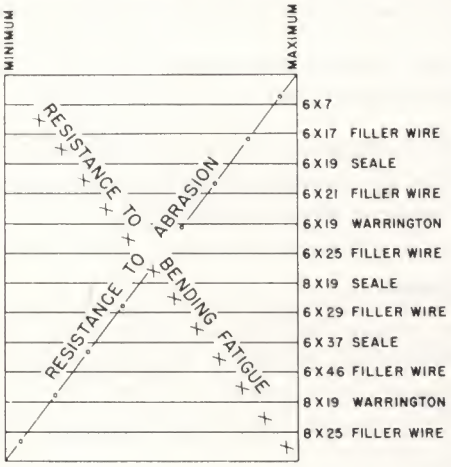


Resistance to severe abrasive wear on wire rope is obtained with *Lang Lay* construction—and with *large outer wires.*

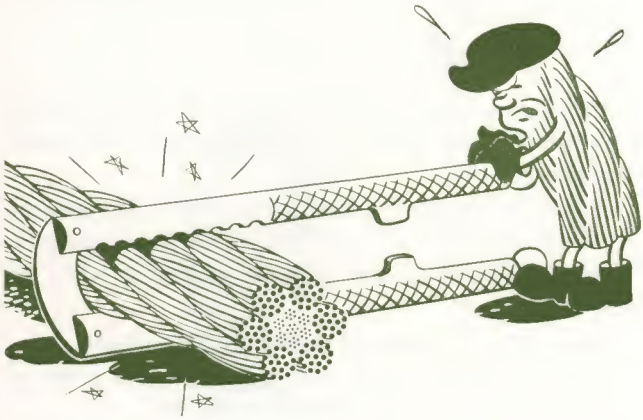
In Lang Lay construction, the wires in the strand are twisted in the same direction as the strands in the rope. This provides *greater lengths of wire* to take wear.

Ropes with large outer wires will take more abrasive wear because the individual wires have a *greater outside area* for wear.

The relative resistance to abrasion and flexibility of various constructions is illustrated here:



Resistance to Crushing or Distortion



Large outer wires and a *wire center* increase the ability of wire rope to resist crushing and distortion.

Large outer wires spread out the load on the individual wire over a *greater area.*

A wire center or an independent wire rope center *supports* the outside strands, preventing the rope from being crushed or distorted.

Conclusion

The proper balance of these four *properties* of wire rope—its strength, flexibility, and resistance to abrasion and crushing—is the secret to selecting the right rope to meet the *individual requirements* of each job.

To Be More Specific

Let's consider step by step in detail the items you specify when you order wire rope.

Just like ordering an automobile or any other machine equipment, a correct order for wire rope includes *complete* information on what you want:

Length . . . . . (300′)

Diameter . . . . . ($\frac{7}{8}$″)

Number of strands . . . . . (6)

Number of wires in each strand . . . . . (19)

Arrangement of wires in each strand . (Seale Patent)

Grade of steel used in rope . (Bright Improved Plow)

Kind of fabrication . . . . . (Preformed)

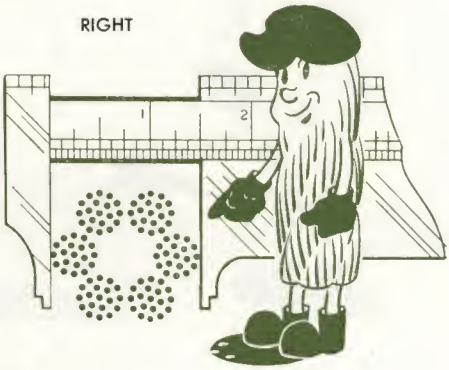
Type of core . . . . . (Hemp)

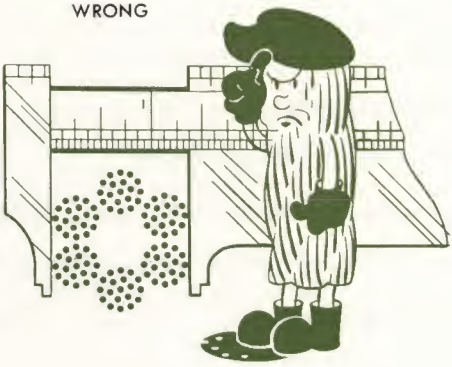
Lay . . . . . (Right Regular)

Length and Diameter

These simple dimensions are measured in feet and inches.

The correct diameter of a wire rope is the diameter of a circle which will enclose the rope—the distance between its widest points.





Number of Strands

Wire rope is made of several strands laid together around a core.

The number of strands in a wire rope may vary from three to eighteen, but most ropes are made of *six* to *eight* strands.

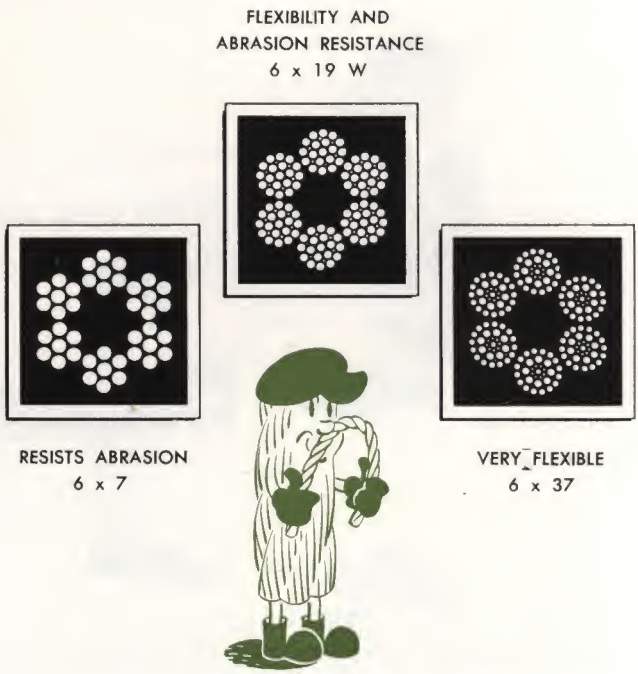
The more strands a rope has, the greater its flexibility.

Coarse laid ropes, standard flexible ropes, and special flexible ropes are manufactured with six strands.

Extra flexible ropes have eight strands and special non-rotating ropes have eighteen strands.

Number of Wires in Each Strand

Strands made of a large number of small wires are more *flexible* than strands formed with a small number of large wires. But strands with a small number of large wires are more resistant to *abrasion*.



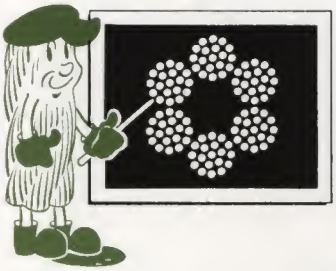
Coarse laid strands are usually composed of *seven* wires.

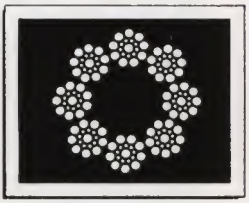
Standard flexible or extra flexible strands have *nineteen* wires, and sometimes have small filler wires which increase the total to twenty-five wires.

Special flexible strands have from twenty-seven wires up to forty-six, but *thirty-seven* wires is the most common construction.

Arrangement of Wires in the Strand

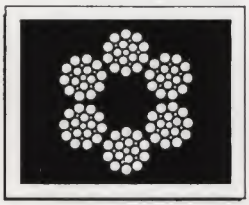
The wires in a strand are commonly arranged in one of four constructions:





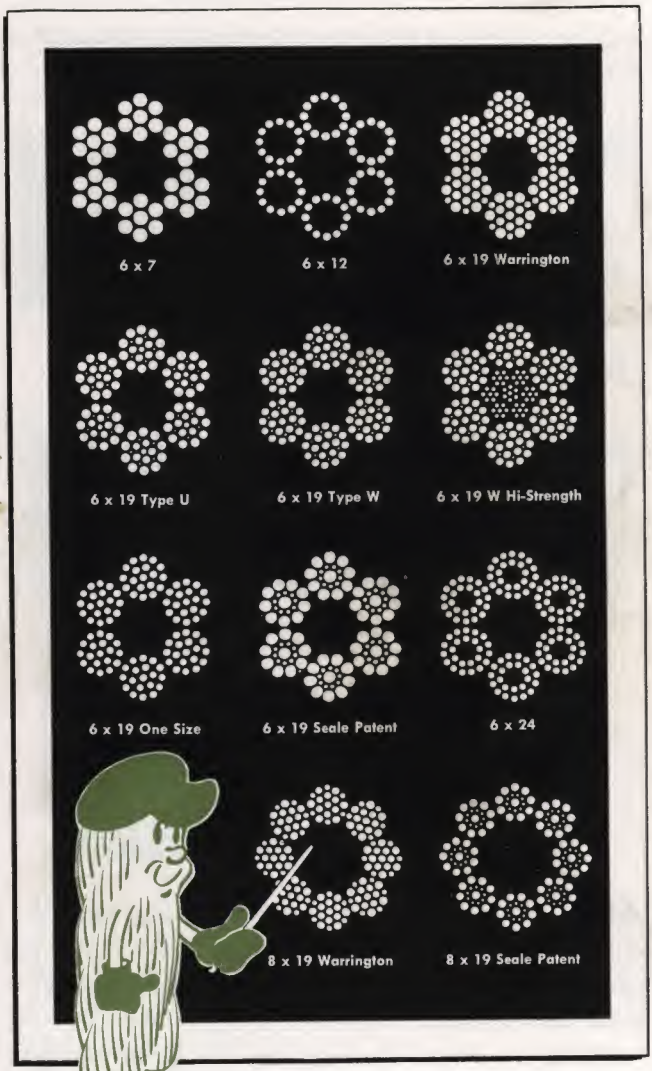
One Size, in which all wires in the strand are the same size. This gives *flexibility* but does not give the strength of other constructions.

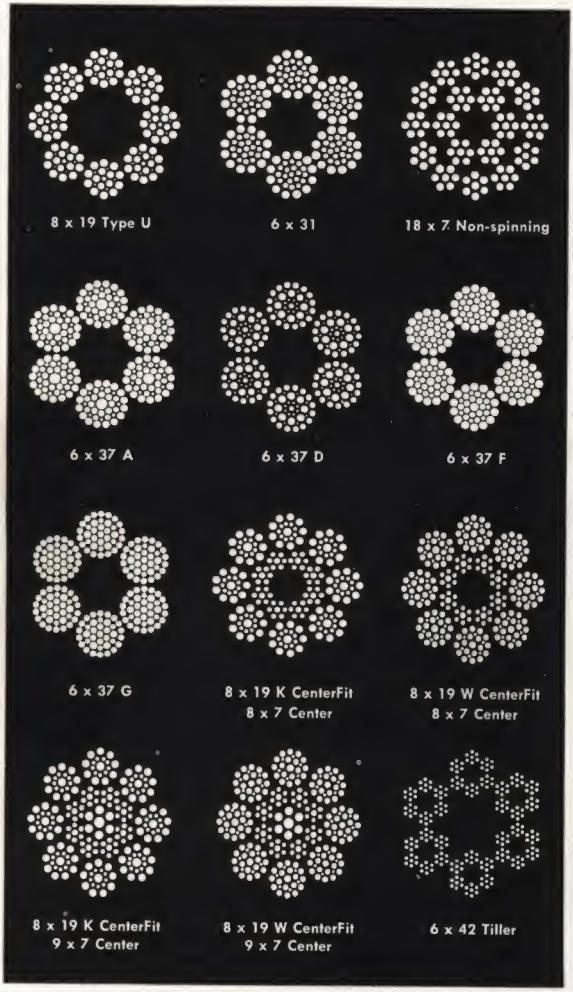
Seale, in which the outer layer of large wires imprisons the smaller wires of the inside layer. This construction has high *resistance to abrasion* but sacrifices flexibility.



Warrington, in which the outer wires are alternately large and small, *gives high flexibility and strength* but has a low abrasion and crushing resistance rating.

Filler, in which small wires fill spaces between larger wires, has *maximum crushing strength*, and a good balance of strength, flexibility, and resistance to abrasion.


6 x 7
6 x 12
6 x 19 Warrington
6 x 19 Type U
6 x 19 Type W
6 x 19 W Hi-Strength
6 x 19 One Size
6 x 19 Seale Patent
6 x 24
8 x 19 Warrington
8 x 19 Seale Patent

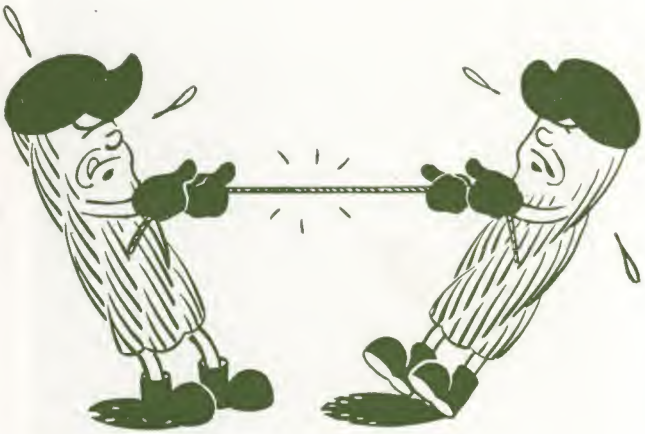

8 x 19 Type U
6 x 31
18 x 7 Non-spinning
6 x 37 A
6 x 37 D
6 x 37 F
6 x 37 G
8 x 19 K CenterFit
8 x 7 Center
8 x 19 W CenterFit
8 x 7 Center
8 x 19 K CenterFit
9 x 7 Center
8 x 19 W CenterFit
9 x 7 Center
6 x 42 Tiller

Grade of Steel Used in the Rope

The grade of steel in rope wire is one of the biggest factors in the *strength* of a rope.

Since J&L is a basic producer of steel, it can *closely control the quality* of the steel in its wire rope all the way from the ore mines through the final production process.

J&L ropes are made of four standard grades of J&L controlled quality steel:



Improved Plow Steel has the highest tensile strength—between 240,000 and 300,000 pounds per square inch—and the greatest resistance to abrasion. It is the premium grade of steel.

Plow Steel has a tensile strength between 220,000 and 240,000 pounds per square inch.

Mild Plow Steel has a tensile strength between 200,000 and 220,000 pounds per square inch.

Iron has a tensile strength of approximately 100,000 pounds per square inch.

Comparative Table of Strengths

(One inch diameter 6 x 19 with hemp center, wire rope.)

Grade	*Breaking Strength*
Improved Plow Steel	41.8 tons
Plow Steel	36.4 tons
Mild Plow Steel	31.6 tons
Iron	13.7 tons

All of these grades of wire are available either *bright* or *galvanized.*

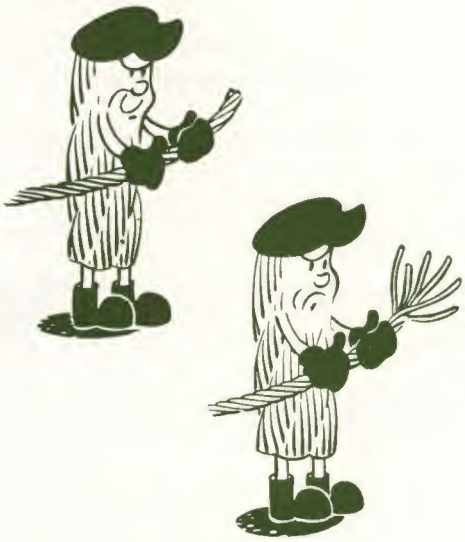
Bright wire is a *polished quality product* with the same finish as when it emerges from the wire drawing machines.

Galvanized wire has been coated with a fine surface of zinc, to prevent *corrosion.*

Kind of Fabrication

Wire rope is either *Preformed* or *Non-preformed.*

Preforming is done when the rope is being manufactured. The wire and the strands of the rope are shaped to fit the position they assume in the finished rope. J&L Preformed ropes are called *Permaset.*



The non-preformed rope is *more lively* and *more springy* than the preformed rope.

Permaset rope is *more flexible,* handles more easily, and has greater resistance to fatigue from bending —because the internal stresses have been removed so that the rope does not "work against itself."

The most revolutionary change in the manufacture of wire rope since preforming, is the development of J&L's new exclusive eight strand rope with *integrated* steel wire center, known as *CenterFit.*

CenterFit consists of seventeen separate wire strands closed in a *single operation*. Compared to conventional six strand rope with independent wire rope center, *CenterFit* has the following advantages:

SMOOTHER EXTERNAL BEARING SURFACE.

BETTER BEARING INSIDE THE ROPE.

GREATER FLEXIBILITY.

GREATER STRENGTH, MORE METALLIC AREA OF THE CROSS SECTION AND MORE EQUAL STRESS DISTRIBUTION AMONG ALL SEVENTEEN STRANDS.

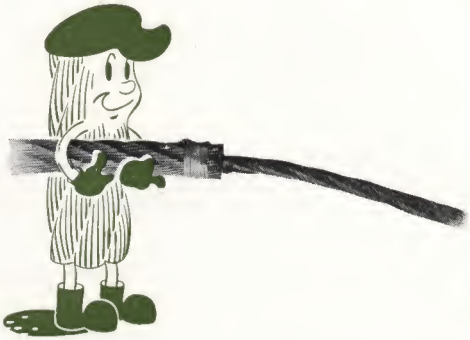
And *CenterFit* is available in *Permaset* (preformed) construction.

This means it is one of the *toughest combinations of strength and flexibility* in wire rope ever designed. It is specially useful for *hoist lines*, where the rope is flexed rapidly over relatively small diameter sheaves, while it is under heavy load.

Type of Core

The core is the foundation of a wire rope around which the strands are laid. In J&L ropes, cores are made of fiber, Uni-Zact, and wire.

Besides supporting the strands, the *fiber core* serves as a source of *lubrication* and makes the rope more *flexible.*



Uni-Zact cores are made of strips of parchment paper, thoroughly impregnated with lubricant and twisted to the correct uniformly cylindrical size.

This core was designed and developed to provide *greater support* than the hemp core, and *greater flexibility* than the wire core. It is less flexible than the hemp core, however, and not as strong as the wire core.

Wire cores are either independent wire rope centers or wire strands.

The independent wire rope center is a *separate wire rope* which serves as the core of the rope.

The wire strand core is a *single strand* usually of the same construction as the other strands of the rope.

Wire cores *increase resistance* to *crushing* and make a *stronger* rope. They are also used where *heat* might damage fiber cores.

Wire Rope Lays

There are five types of rope lays: right and left regular lay, right and left lang lay, and alternate lay.

In *Regular Lay* ropes, the wires in the strand are laid in the *opposite* direction to the lay of the strands.

In *Right Regular Lay* rope, the wires in the strand are laid to the left and each strand is laid to the right.

In *Left Regular Lay* rope, the wires in the strand are laid to the right and each strand is laid to the left.

Regular Lay ropes are less likely to be *kinked*, and give additional *resistance* to *crushing*, *distortion*, and *rotating*.

In Lang Lay ropes, the wires in the strand are laid in the *same* direction as the lay of the strands.

In *Right Lang Lay* rope, both the wires in the strand and the strands in the rope are laid to the right.

In *Left Lang Lay*, both the wires in the strand and the strands in the rope are laid to the left.

Lang Lay ropes have *maximum flexibility*, and are *highly resistant to abrasion and fatigue.*

Alternate Lay ropes, consisting of alternate left and right lay strands, have very limited use. They resist distortion and prevent clamp slippage, but sacrifice other advantages.

When the Rope is Selected

Here is the information included in some typical orders:

Dragline: 1000′, 1¾″, 6 x 19, "U", Bright Improved Plow Steel, Permaset, I.W.R.C., Lang Lay.

Log Skidding Rope: 1100′, 1¼″, 6 x 19 Seale, Bright Plow Steel, Non-Preformed, Hemp, Regular Lay.

Oil Sand Line: 600′, ½″, 6 x 7, Bright Mild Plow Steel, Non-Preformed, Hemp Regular Lay.

Marine Tiller Rope: 400′, ½″, 6 x 42, Galvanized Plow Steel, Non-Preformed, Seven Fiber Cores, Regular Lay.

Clamshell Closing Line: 800′ 1⅛″, 8 x 19W, Bright Improved Plow Steel, Permaset, CenterFit, Hemp Center, Right Regular Lay.

J&L engineers will be glad to help you *select the correct rope* for your job requirements, or they will *custombuild* a rope to meet your particular requirements.

Where to Get J&L Wire Rope

First, see your regular equipment and materials supplier. Approximately 260 suppliers throughout the country carry J&L wire rope.

J&L wire rope is available also at wire rope warehouses operated by the corporation or the Jones & Laughlin Steel Products Company in:

Birmingham, Ala.
Denver, Colo.
Houston, Texas
Minneapolis, Minn.
Philadelphia, Pa.
Pittsburgh, Pa.
San Francisco, Cal.
Savannah, Ga.
Los Angeles, Cal.
Odessa, Texas

Or at one of our general warehouses in:

Chicago, Ill.
Detroit, Mich.
Memphis, Tenn.
New Orleans, La.
New York, N.Y.

Or at one of the seventy-eight Jones & Laughlin Supply Company stores located in seventeen states.

Or through one of our district sales offices in:

Atlanta, Ga.
Baltimore, Md.
Washington, D.C.
Buffalo, N.Y.
Cincinnati, Ohio
Cleveland, Ohio
Indianapolis, Ind.
Los Angeles, Cal.
Memphis, Tenn.
St. Louis, Mo.
Seattle, Wash.
Tulsa, Okla.
Boston, Mass.

SECTION III

CATALOGUE OF
STANDARD J&L WIRE
ROPE CONSTRUCTIONS

STANDARD J & L WIRE ROPES

CONVENTIONAL SIZES, GRADES AND CONSTRUCTIONS—AND THEIR PHYSICAL PROPERTIES

STEEL CORE: The term *Steel Core* used in these tables refers to both Wire Strand Centers and Independent Wire Rope Centers.

PERMASET AND NON-PREFORMED: Strengths and weights of Permaset and Non-Preformed Ropes of the same size, grade and construction are identical.

NON-STANDARD ROPES: The Wire Ropes included in these tables are those of J&L Standard Designs. Many additional types can be built on the versatile fabricating machines of our modern and efficient factory. J&L Rope Engineers stand always ready to design ropes with special properties to suit the unusual requirements of your equipment and conditions of operation. Your inquiries will receive our prompt attention.

GALVANIZED ROPES: To determine breaking strengths of galvanized cables not published, deduct 10% of the bright breaking strength.

6 x 7* ROPES

BRIGHT PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds		Breaking Strength—Tons of 2000 Pounds					
				Improved Plow		Plow Steel		Mild Plow	
		Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core
1/4	3/4	.094	.103	2.64	2.84	2.30	2.47	2.00	2.15
5/16	1	.15	.165	4.10	4.41	3.56	3.83	3.10	3.33
3/8	1 1/8	.21	.231	5.86	6.30	5.10	5.48	4.43	4.76
7/16	1 3/8	.29	.319	7.93	8.52	6.90	7.42	6.00	6.45
1/2	1 5/8	.38	.418	10.3	11.07	8.96	9.63	7.79	8.37
9/16	1 3/4	.48	.528	13.0	13.98	11.3	12.15	9.82	10.56
5/8	2	.59	.649	15.9	17.09	13.9	14.94	12.0	12.90
3/4	2 3/8	.84	.924	22.7	24.40	19.8	21.29	17.2	18.49
7/8	2 3/4	1.15	1.265	30.7	33.00	26.7	28.70	23.2	24.94
1	3 1/8	1.50	1.650	39.7	42.68	34.5	37.09	30.0	32.25
1 1/8	3 1/2	1.90	2.090	49.8	53.54	43.3	46.55	37.7	40.53
1 1/4	3 7/8	2.34	2.574	61.0	65.58	53.0	56.98	46.1	49.56
1 3/8	4 3/8	2.84	3.124	73.1	78.58	63.6	68.37	55.3	59.45
1 1/2	4 3/4	3.38	3.718	86.2	92.67	75.0	80.63	65.2	70.09

*6x8 Ropes have approximately the same weights and strengths as ropes of 6x7 construction.

ROPES OF THE 6 x 19 CLASS

BRIGHT PERMASET AND NON-PREFORMED

POPULARITY

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds		Breaking Strength—Tons of 2000 Pounds					
				Improved Plow		Plow Steel		Mild Plow	
		Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core
1/4	3/4	.10	.11	2.74	2.95	2.39	2.57	2.07	2.23
5/16	1	.16	.18	4.26	4.58	3.71	3.99	3.22	3.46
3/8	1 1/8	.23	.25	6.10	6.56	5.31	5.71	4.62	4.97
7/16	1 3/8	.31	.34	8.27	8.89	7.19	7.73	6.25	6.72
1/2	1 5/8	.40	.44	10.7	11.50	9.35	10.05	8.13	8.74
9/16	1 3/4	.51	.56	13.5	14.51	11.8	12.69	10.2	10.97
5/8	2	.63	.69	16.7	17.95	14.5	15.59	12.6	13.55
3/4	2 3/8	.90	.99	23.8	25.59	20.7	22.25	18.0	19.35
7/8	2 3/4	1.23	1.35	32.2	34.62	28.0	30.10	24.3	26.12

ROPES OF THE 6 x 19 CLASS

BRIGHT PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds		Breaking Strength—Tons of 2000 Pounds					
				Improved Plow		Plow Steel		Mild Plow	
		Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core
1	3 1/8	1.60	1.76	41.8	44.94	36.4	39.13	31.6	33.97
1 1/8	3 1/2	2.03	2.23	52.6	56.55	45.7	49.13	39.8	42.79
1 1/4	3 7/8	2.50	2.75	64.6	69.45	56.2	60.42	48.8	52.46
1 3/8	4 3/8	3.03	3.33	77.7	83.53	67.5	72.56	58.8	63.21
1 1/2	4 3/4	3.60	3.96	92.0	98.90	80.0	86.00	69.6	74.82
1 5/8	5 1/8	4.23	4.65	107.0	115.03	93.4	100.41	81.2	87.29
1 3/4	5 1/2	4.90	5.39	124.0	133.30	108.0	116.10	93.6	100.62
1 7/8	5 7/8	5.63	6.19	141.0	151.58	123.0	132.23	107.0	115.03
2	6 1/4	6.40	7.04	160.0	172.00	139.0	149.43	121.0	130.08
2 1/8	6 5/8	7.23	7.95	179.0	192.43	156.0	167.70	....	.....
2 1/4	7 1/8	8.10	8.91	200.0	215.00	174.0	187.05	....	.....
2 1/2	7 7/8	10.00	11.00	244.0	262.30	212.0	227.90	....	.....
2 3/4	8 5/8	12.10	13.31	292.0	313.90	254.0	273.05	....	.....

ROPES OF THE 6 x 37 CLASS

BRIGHT PERMASET AND NON-PREFORMED

FLEXIBILITY AND STRENGTH

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds		Breaking Strength—Tons of 2000 Pounds			
				Improved Plow		Plow Steel	
		Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Stee. Core
1/4	3/4	.10	.11	2.59	2.78	2.25	2.42
5/16	1	.16	.18	4.03	4.33	3.50	3.76
3/8	1 1/8	.22	.24	5.77	6.20	5.02	5.40
7/16	1 3/8	.30	.33	7.82	8.41	6.80	7.31
1/2	1 5/8	.39	.43	10.2	10.97	8.85	9.51
9/16	1 3/4	.49	.54	12.9	13.87	11.2	12.04
5/8	2	.61	.67	15.8	16.99	13.7	14.73

ROPES OF THE 6 x 37 CLASS

BRIGHT PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds		Breaking Strength—Tons of 2000 Pounds			
				Improved Plow		Plow Steel	
		Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core
3/4	2 3/8	.87	.96	22.6	24.30	19.6	21.07
7/8	2 3/4	1.19	1.31	30.6	32.90	26.6	28.60
1	3 1/8	1.55	1.71	39.8	42.79	34.6	37.20
1 1/8	3 1/2	1.96	2.16	50.1	53.86	43.5	46.76
1 1/4	3 7/8	2.42	2.66	61.5	66.11	53.5	57.51
1 3/8	4 3/8	2.93	3.22	74.1	79.66	64.5	69.34
1 1/2	4 3/4	3.49	3.84	87.9	94.49	76.4	82.13
1 5/8	5 1/8	4.09	4.50	103.0	110.73	89.3	96.00
1 3/4	5 1/2	4.75	5.23	119.0	127.93	103.0	110.73
1 7/8	5 7/8	5.45	6.00	136.0	146.20	118.0	126.85
2	6 1/4	6.20	6.82	154.0	165.55	134.0	144.05
2 1/8	6 5/8	7.00	7.70	173.0	185.98	150.0	161.25
2 1/4	7 1/8	7.85	8.64	193.0	207.48	168.0	180.60
2 1/2	7 7/8	9.69	10.66	236.0	253.70	205.0	220.38
2 3/4	8 5/8	11.72	12.89	284.0	305.30	247.0	265.53
3	9 3/8	13.95	15.35	335.0	360.13	291.0	312.83

ROPES OF THE 8 x 19 CLASS

BRIGHT PERMASET AND NON-PREFORMED

SPEED AND FLEXIBILITY

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds		Breaking Strength—Tons of 2000 Pounds			
				Improved Plow		Plow Steel	
		Fiber Core	Steel Core	Fiber Core	Steel Core	Fiber Core	Steel Core
1/4	3/4	.09	.10	2.35	2.53	2.04	2.19
5/16	1	.14	.15	3.65	3.92	3.18	3.42
3/8	1 1/8	.20	.22	5.24	5.63	4.55	4.89
7/16	1 3/8	.28	.31	7.09	7.62	6.17	6.63
1/2	1 5/8	.36	.40	9.23	9.92	8.02	8.62
9/16	1 3/4	.46	.51	11.6	12.47	10.1	10.86
5/8	2	.57	.63	14.3	15.37	12.4	13.33
3/4	2 3/8	.82	.90	20.5	22.04	17.8	19.14
7/8	2 3/4	1.11	1.22	27.7	29.78	24.1	25.91
1	3 1/8	1.45	1.60	36.0	38.70	31.3	33.65
1 1/8	3 1/2	1.84	2.02	45.3	48.70	39.4	42.36
1 1/4	3 7/8	2.27	2.50	55.7	59.88	48.4	52.03
1 3/8	4 3/8	2.74	3.01	67.1	72.13	58.3	62.67
1 1/2	4 3/4	3.26	3.59	79.4	85.36	69.1	74.28

ROPES OF THE CENTERFIT SERIES

IMPROVED PLOW STEEL—INTEGRATED STEEL CENTER
PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approx. Circumference in Inches	Approximate Weight Per Foot in Pounds		Strength—Tons of 2000 Pounds	
		8 x 7 Center	9 x 7 Center	8 x 7 Center	9 x 7 Center
1/2	1 5/8	.46	.49	12.6	13.7
9/16	1 3/4	.57	.61	15.6	17.0
5/8	2	.69	.73	18.7	20.3
3/4	2 3/8	1.01	1.07	26.8	29.1
7/8	2 3/4	1.37	1.45	35.9	38.8
1	3 1/8	1.87	1.99	48.5	52.3
1 1/8	3 1/2	2.42	2.56	61.2	66.2

18 x 7 NON-ROTATING ROPES

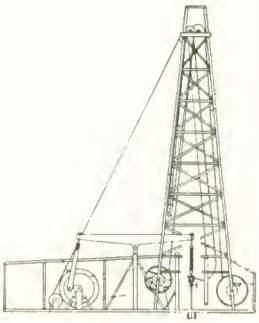
ONE FIBER CORE
PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approx. Circumference in Inches	Weight Per Foot in Pounds	Breaking Strength Tons of 2000 Pounds	
			Improved Plow	Plow Steel
			Bright	Bright
3/8	1 1/8	.24	5.59	4.86
7/16	1 3/8	.33	7.58	6.59
1/2	1 5/8	.43	9.85	8.57
9/16	1 3/4	.55	12.4	10.8
5/8	2	.68	15.3	13.3
3/4	2 3/8	.97	21.8	19.0
7/8	2 3/4	1.32	29.5	25.7
1	3 1/8	1.73	38.3	33.3
1 1/8	3 1/2	2.19	48.2	41.9
1 1/4	3 7/8	2.70	59.2	51.5
1 3/8	4 3/8	3.27	71.3	62.0
1 1/2	4 3/4	3.89	84.4	73.4

SPECIAL 3-STRAND CORELESS SLUSHER ROPES
3 x 19 CLASS

PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Weight Per Foot in Pounds	Breaking Strength Tons of 2000 Pounds	
		Improved Plow	Plow Steel
5/16	.15	4.5	3.9
3/8	.21	6.2	5.4
1/2	.38	10.8	9.4
5/8	.60	16.8	14.6
3/4	.86	23.7	20.6
7/8	1.18	31.8	27.7
1	1.54	41.2	35.8



TORPEDO LINES FOR OIL AND GAS WELLS

5 X 5—ONE FIBER CORE
PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Weight Per Foot in Pounds	Breaking Strength in Pounds			
		Improved Plow		Plow Steel	
		Bright	Galvanized	Bright	Galvanized
1/8	.022	1250	1125	1100	990
9/64	.027	1600	1440	1400	1260
5/32	.033	1950	1755	1700	1530
3/16	.050	2900	2610	2500	2250
1/4	.083	4800	4320	4200	3780

GALVANIZED IRON GRADE RIGGING AND GUY ROPES

6 X 7—ONE FIBER CORE

PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds	Breaking Strength Tons of 2000 Pounds
			Fiber Core
1/4	3/4	0.094	0.918
5/16	1	.15	1.42
3/8	1 1/8	.21	2.04
7/16	1 3/8	.29	2.76
1/2	1 5/8	.38	3.58
9/16	1 3/4	.48	4.51
5/8	2	.59	5.54
3/4	2 3/8	.84	7.90
13/16	2 1/2	.99	9.23
7/8	2 3/4	1.15	10.7
1	3 1/8	1.50	13.8
1 1/16	3 3/8	1.70	15.5
1 1/8	3 1/2	1.90	17.3
1 3/16	3 3/4	2.12	19.2
1 1/4	3 7/8	2.34	21.2

9 x 4 GALVANIZED IRON MAST ARM ROPES

ONE FIBER CORE

PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Weight Per Foot in Pounds	Breaking Strength in Pounds
1/4	.070	1100
5/16	.107	1530
3/8	.158	2200

FISHING ROPES AND CARGO FALL LINES

6 X 19—ONE FIBER CORE

PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds	Breaking Strength—Tons of 2000 Pounds					
			Improved Plow		Plow Steel		Mild Plow	
			Bright	Galvanized	Bright	Galvanized	Bright	Galvanized
5/16	1	.16	4.26	3.83	3.71	3.34	3.22	2.90
3/8	1 1/8	.23	6.10	5.49	5.31	4.78	4.62	4.16
7/16	1 3/8	.31	8.27	7.44	7.19	6.47	6.25	5.63
1/2	1 5/8	.40	10.7	9.63	9.35	8.42	8.13	7.32
9/16	1 3/4	.51	13.5	12.15	11.8	10.62	10.2	9.18
5/8	2	.63	16.7	15.03	14.5	13.05	12.6	11.34
3/4	2 3/8	.90	23.8	21.42	20.7	18.63	18.0	16.20
7/8	2 3/4	1.23	32.2	28.98	28.0	25.20	24.3	21.87
1	3 1/8	1.60	41.8	37.62	36.4	32.76	31.6	28.44
1 1/8	3 1/2	2.03	52.6	47.34	45.7	41.13	39.8	35.82
1 1/4	3 7/8	2.50	64.6	58.14	56.2	50.58	48.8	43.92

GALVANIZED MARINE RUNNING ROPES

6 X 12—7 FIBER CORES
PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approx. Circumference in Inches	Weight Per Foot In Pounds	Breaking Strength Tons of 2000 Pounds		
			Improved Plow	Plow Steel	Iron Grade
5/16	1	0.10	2.34	2.04	0.905
3/8	1 1/8	.15	3.36	2.92	1.30
7/16	1 3/8	.20	4.55	3.95	1.76
1/2	1 5/8	.26	5.91	5.14	2.28
9/16	1 3/4	.33	7.45	6.48	2.88
5/8	2	.41	9.16	7.97	3.54
3/4	2 3/8	.59	13.1	11.4	5.06
13/16	2 1/2	.69	15.3	13.3	5.92
7/8	2 3/4	.80	17.7	15.4	6.85
1	3 1/8	1.05	23.0	20.0	8.89
1 1/16	3 3/8	1.19	25.9	22.5	10.0
1 1/8	3 1/2	1.33	29.0	25.2	. . .
1 3/16	3 3/4	1.48	32.2	28.0	. . .
1 1/4	3 7/8	1.64	35.6	30.9	. . .
1 3/8	4 3/8	1.99	42.8	37.2	. . .
1 7/16	4 1/2	2.17	46.7	40.6	. . .
1 1/2	4 3/4	2.36	50.7	44.1	. . .
1 5/8	5 1/8	2.77	59.2	51.4	. . .
1 11/16	5 1/4	2.99	63.6	55.3	. . .
1 3/4	5 1/2	3.22	68.3	59.4	. . .
1 13/16	5 3/4	3.45	73.0	63.5	. . .
1 15/16	6 1/8	3.94	83.0	72.2	. . .
2	6 1/4	4.20	88.2	76.7	. . .
2 1/16	6 1/2	4.47	93.6	81.4	. . .

GALVANIZED MARINE MOORING LINES

6 X 24—7 FIBER CORES

PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds	Breaking Strength Tons of 2000 Pounds	
			Improved Plow	Plow Steel
3/8	1 1/8	.194	4.77	4.14
1/2	1 5/8	.35	8.40	7.30
5/8	2	.54	13.0	11.3
3/4	2 3/8	.78	18.6	16.2
13/16	2 1/2	.91	21.8	19.0
7/8	2 3/4	1.06	25.2	21.9
1	3 1/8	1.38	32.8	28.5
1 1/16	3 3/8	1.56	36.9	32.1
1 1/8	3 1/2	1.75	41.2	35.9
1 3/16	3 3/4	1.95	45.9	39.9
1 1/4	3 7/8	2.16	50.7	44.1
1 3/8	4 3/8	2.61	61.0	53.1
1 7/16	4 1/2	2.85	66.5	57.9
1 1/2	4 3/4	3.11	72.3	62.9
1 5/8	5 1/8	3.64	84.5	73.4
1 11/16	5 1/4	3.93	90.9	79.0
1 3/4	5 1/2	4.23	97.5	84.8
1 13/16	5 3/4	4.53	104.0	90.8
1 15/16	6 1/8	5.18	119.0	103.0
2	6 1/4	5.52	126.0	110.0
2 1/16	6 1/2	5.87	134.0	116.0

GALVANIZED MARINE TOWING HAWSERS

6 X 37 TYPE G—ONE FIBER CORE
PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds	Breaking Strength Tons of 2000 Pounds	
			Improved Plow	Plow Steel
3/4	2 3/8	.87	21.0	18.2
13/16	2 1/2	1.02	24.5	21.3
7/8	2 3/4	1.19	28.4	24.7
1	3 1/8	1.55	36.9	32.1
1 1/16	3 3/8	1.75	41.6	36.1
1 1/8	3 1/2	1.96	46.5	40.4
1 3/16	3 3/4	2.19	51.7	44.9
1 1/4	3 7/8	2.42	57.1	49.7
1 3/8	4 3/8	2.93	68.8	59.8
1 7/16	4 1/2	3.20	75.0	65.3
1 1/2	4 3/4	3.49	81.5	70.9
1 5/8	5 1/8	4.09	95.3	82.9
1 11/16	5 1/4	4.41	103.0	89.2
1 3/4	5 1/2	4.75	110.0	95.7
1 13/16	5 3/4	5.09	118.0	102.0
1 15/16	6 1/8	5.82	134.0	117.0
2	6 1/4	6.20	143.0	124.0
2 1/16	6 1/2	6.59	151.0	132.0
2 1/8	6 5/8	7.00	160.0	139.0
2 1/4	7 1/8	7.85	179.0	156.0
2 5/16	7 1/4	8.29	189.0	164.0
2 3/8	7 1/2	8.74	199.0	173.0

SPRING LAY ROPES

GALVANIZED PLOW STEEL—PERMASET

6 X 3 X 19 —3 FIBER STRANDS—ONE FIBER CORE

Rope Diameter in Inches	Approximate Circumference in Inches	Weight Per Foot in Pounds	Breaking Strength Tons of 2000 Pounds
1/2	1 5/8	.22	4.0
9/16	1 3/4	.28	5.0
5/8	2	.34	6.25
3/4	2 3/8	.49	9.0
7/8	2 3/4	.63	12.25
1	3 1/8	.88	15.0
1 1/8	3 1/2	1.14	19.0
1 1/4	3 7/8	1.36	23.5
1 3/8	4 3/8	1.66	28.0
1 1/2	4 3/4	1.97	36.0
1 5/8	5 1/8	2.28	42.0
1 3/4	5 1/2	2.67	49.0
1 7/8	5 7/8	3.09	56.0
2	6 1/4	3.53	60.0

6 x 42 TILLER ROPES (6 x 6 x 7)

SEVEN FIBER CORES

PERMASET AND NON-PREFORMED

Rope Diameter in Inches	Approx. Circumference in Inches	Weight Per Foot in Pounds	Breaking Strength in Tons of 2000 Pounds			
			Plow Steel		Iron Grade	
			Bright	Galv.	Bright	Galv.
1/4	3/4	.07	1.31	1.18	.584	.526
5/16	1	.11	2.05	1.85	.908	.817
3/8	1 1/8	.16	2.93	2.64	1.30	1.17
7/16	1 3/8	.21	3.98	3.58	1.77	1.59
1/2	1 5/8	.28	5.18	4.66	2.30	2.07
9/16	1 3/4	.35	6.53	5.88	2.90	2.61
5/8	2	.43	8.04	7.24	3.57	3.21

6 x 7 PERMASET AIRCRAFT CABLE

GALVANIZED

Rope Diameter in Inches	Weight Per Foot in Pounds		Breaking Strength in Pounds	
	Fiber Core	Steel Core	Fiber Core	Steel Core
1/16	.0068	.0075	400	480
5/64	.0100	.0110	550	650
3/32	.0145	.0160	800	920
7/64	.0200	.0220	1050	1260
1/8	.0255	.0280	1440	1700
5/32	.0390	.0430	2200	2600
3/16	.0560	.0620	3150	3700
7/32	.0750	.0830	4100	4800
1/4	.0970	.1060	5200	6100
9/32	.1220	.1340	6600	7600
5/16	.1520	.1670	8000	9200
11/32	.1820	.2010	9500	11100
3/8	.2150	.2360	11500	13100

7 x 19 PERMASET AIRCRAFT CABLE

GALVANIZED

Rope Diameter in Inches	Weight Per Foot in Pounds	Breaking Strength in Pounds
	Steel Core	
1/8	.029	2000
5/32	.045	2800
3/16	.065	4200
7/32	.086	5600
1/4	.110	7000
9/32	.139	8000
5/16	.173	9800
11/32	.207	12500
3/8	.243	14400

Wire Rope End Attachments

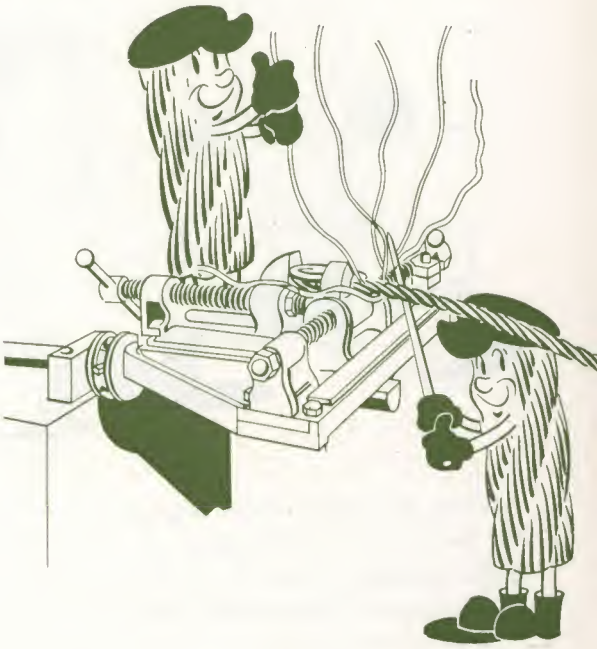
A rope is no stronger than its end attachment. Highly specialized *experts* at our wire rope division are ready to provide you with any type of spliced or poured fitting your job may require.

When *seizing* wire rope, here are a few handy things to remember:

- Use eight to ten wraps of seizing wire, winding it on tightly by hand.
- Twist the ends of the wires together near the center of the seizing, and tighten by prying away from the rope with wire cutters.
- Be sure the seizing is *tight* before clipping and knocking the wire ends flat against the rope.
- Steel ropes with a regular lay should have *three* seizings on each side of a cut if it has a *hemp center*, and *four* if it has an *independent wire rope center*. Only one seizing on each side is required when cutting Permaset.

Splicing

An operation requiring a high degree of skill is splicing rope around thimbles, or joining two rope ends by splicing.



Splicing must be done with a great deal of care and precision in laying the various rope strands *tightly* together.

A *loose* strand in the finished splice will throw the rope out of "balance" and some strands will be carrying more of the load than others. This means early rope failure.

There are many different types of splices depending upon the rope construction and the use of the rope.

Socketing the Rope

When socketing a rope, seize it at a distance from the end equal to the length of the tapered basket of the socket. If it has a hemp center, cut the center out. If it has a wire center do not cut it out.

Next broom out the ends of the wires and clean them thoroughly in benzine, naphtha, or gasoline. The broom is then dipped in a 50 percent solution of commercial muriatic acid to a depth of ¾ the length of the socket basket for about one minute.

The acid is neutralized by dipping the broom in boiling water and allowing it to dry in air. *Keep it clean!*

The broom is now bunched together with a piece of tie wire, and the socket is driven on. The tie wire is removed, and the socket is driven down to the seizing.

When the base of the socket is sealed with clay, asbestos, or taped, the socket is ready to be poured.

Pure zinc at the correct temperature of approximately 800 to 875 degrees Fahrenheit, should be poured into the socket slowly until it barely covers the tops of the wires. Tap the socket lightly to jar the zinc into all crevices.

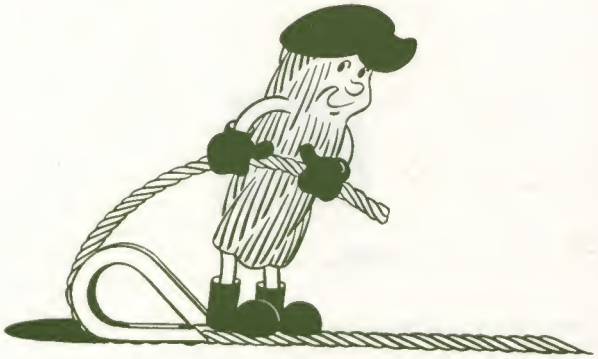
When the zinc has become solid, the seal is removed and all seizing taken off except the seizing nearest to the socket.

Correctly poured the socket attachment will develop the full strength of the rope.

WIRE ROPE THIMBLES

REGULAR PATTERN

WROUGHT STEEL—GALVANIZED



For Rope Diam., Inches	Dimensions in Inches						Est. Wt. Per 100 in Lbs.
	Over-all Length	Over-all Width	Length Inside	Width Inside	Width of Score	For Diam. Pin	
1/8	1 5/8	1	1 1/4	5/8	5/32	9/16	2 3/4
3/16	2	1 1/8	1 5/16	11/16	7/32	5/8	3 3/4
1/4	2	1 1/8	1 5/16	11/16	5/16	5/8	3 3/4
5/16	2 1/4	1 5/16	1 1/2	13/16	3/8	3/4	7
3/8	2 3/8	1 1/2	1 5/8	15/16	7/16	7/8	8 3/4
7/16	2 3/4	1 3/4	1 3/4	1 1/16	1/2	1	14 1/2
1/2	3	1 7/8	1 7/8	1 1/8	9/16	1 1/16	16 1/2
5/8	3 3/4	2 1/2	2 1/4	1 3/8	11/16	1 1/4	40 1/2
3/4	4	2 3/4	2 1/2	1 5/8	13/16	1 1/2	50
7/8	5 1/2	3 1/8	3 1/2	1 7/8	15/16	1 3/4	77
1	6	3 1/2	4 1/4	2	1 1/8	1 7/8	105
1 1/8	6 5/8	4 1/8	4 5/8	2 5/8	1 1/4	2 1/2	150
1 1/4	6 5/8	4 1/8	4 5/8	2 5/8	1 5/16	2 1/2	206
1 1/2	7 7/8	5 1/8	5 1/4	3	1 5/8	2 3/4	300
1 3/4	9 1/4	6 1/4	5 7/8	3 9/16	1 7/8	3 7/16	500
2	11 5/8	7 1/8	7 1/4	4 1/4	2 1/8	4 1/8	760

For use with iron grade or mild plow steel wire ropes. Not recommended for use with heavily loaded plow or improved plow steel ropes.

WIRE ROPE THIMBLES

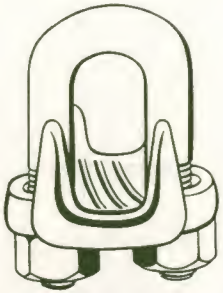
EXTRA HEAVY PATTERN
WROUGHT STEEL—GALVANIZED

For Rope Diam., Inches	Dimensions in Inches						Est. Wt. Per 100 in Lbs.
	Over-all Length	Over-all Width	Length Inside	Width Inside	Width of Score	For Diam. Pin	
1/4	2 1/2	1 9/16	1 5/8	7/8	13/32	13/16	10
5/16	3	1 13/16	1 7/8	1	15/32	15/16	15
3/8	3 3/8	2 1/16	2 1/8	1 1/8	1/2	1 1/16	22
7/16	3 3/4	2 1/4	2 1/2	1 1/4	5/8	1 3/16	30
1/2	4 1/8	2 5/8	2 3/4	1 1/2	23/32	1 7/16	50
9/16	4 1/8	2 5/8	2 3/4	1 1/2	25/32	1 7/16	50
5/8	5 1/2	3 3/16	3 1/4	1 3/4	29/32	1 5/8	75
3/4	6 1/2	3 3/4	3 3/4	2	1 1/16	1 7/8	130
7/8	7 1/8	4 1/16	4 1/4	2 1/4	1 3/16	2 1/8	160
1	8 1/8	4 11/16	4 1/2	2 1/2	1 7/16	2 3/8	280
1 1/8	9 1/2	5 5/8	5	2 7/8	1 5/8	2 3/4	450
1 1/4	9 1/2	5 5/8	5 1/8	2 7/8	1 11/16	2 3/4	450
1 3/8	11 5/8	6 7/8	6 1/4	3 1/2	2 1/16	3 3/8	750
1 1/2	11 5/8	6 7/8	6 1/4	3 1/2	2 1/8	3 3/8	750
1 5/8	13 3/8	7 3/4	8	4	2 3/8	3 7/8	1175
1 3/4	14	8 1/2	9	4 1/2	2 3/4	4 3/8	1800
1 7/8	15	9 1/4	10	5	2 7/8	4 7/8	2200
2	17	10 1/2	12	6	3 1/8	5 7/8	3000

A rugged thimble to withstand the crushing effect of heavy loads. Ample dimensions for easy installation with plow or improved plow steel ropes.

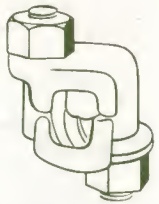
GENUINE CROSBY WIRE ROPE CLIPS

DROP FORGED—GALVANIZED

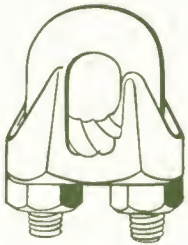


CROSBY

For Rope Diameter in Inches	Minimum Clips Per Fastening	Weight Each in Pounds	For Rope Diameter in Inches	Minimum Clips Per Fastening	Weight Each in Pounds
1/8	2	.05	1 1/8	5	3.32
3/16	2	.09	1 1/4	5	4.48
1/4	2	.18	1 3/8	6	4.88
5/16	2	.30	1 1/2	6	5.44
3/8	2	.47	1 5/8	6	7.02
7/16	2	.71	1 3/4	6	9.28
1/2	3	.73	2	7	12.04
9/16	3	1.01	2 1/4	7	14.81
5/8	3	1.01	2 1/2	8	16.60
3/4	4	1.57	2 3/4	9	22.56
7/8	4	2.42	3	9	32.00
1	4	2.64			



THOMAS LAUGHLIN



MALLEABLE

DROP FORGED THOMAS LAUGHLIN SAFETY CLIPS GALVANIZED

For Rope Diameter in Inches	Minimum Clips Per Fastening	Approximate Weight Each in Pounds	For Rope Diameter in Inches	Minimum Clips Per Fastening	Approximate Weight Each in Pounds
3/16 & 1/4	2	.25	3/4	3	1.34
5/16	2	.29	7/8	4	2.20
3/8	2	.36	1	4	2.60
7/16	2	.48	1 1/8	4	3.12
1/2	2	.57	1 1/4	5	4.10
9/16	2	1.00	1 1/2	5	6.50
5/8	2	1.00			

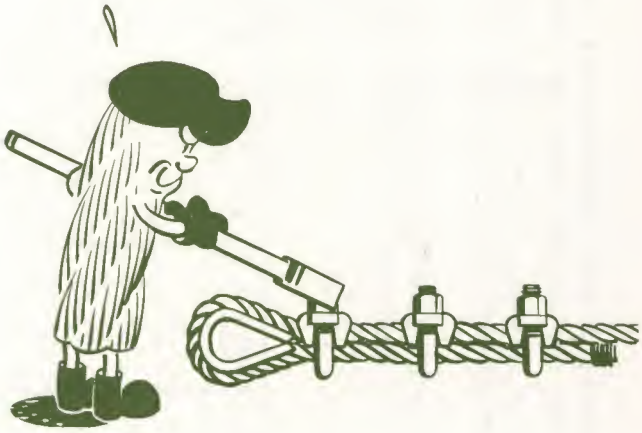
MALLEABLE WIRE ROPE CLIPS

MALLEABLE IRON SADDLE STEEL U-BOLT AND NUTS—GALVANIZED

For Rope Diameter in Inches	Approximate Weight Per 100 Clips—Pounds	For Rope Diameter in Inches	Approximate Weight Per 100 Clips—Pounds
3/16	8 5/8	7/8	125
1/4	13 1/2	1	144
5/16	13 3/4	1 1/8	231
3/8	21	1 1/4	295
7/16	26 1/2	1 3/8	435
1/2	40	1 1/2	495
5/8	56	1 3/4	875
3/4	106	2	1300

Malleable clips are not recommended for use where danger to life and property are involved.

Fastening Crosby Clips



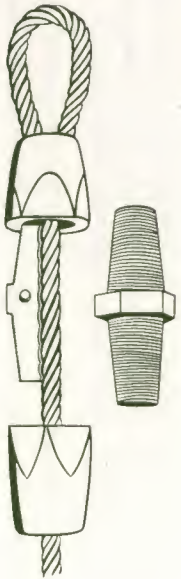
Use the number of clips recommended for the size of the rope according to the chart.

Bend back the dead end of the rope over the thimble so that the clips can be spaced up to *six times* the diameter of the rope for increased tensile efficiency.

The clip farthest from the thimble should be put on first, and placed approximately the length of the clip base from the dead end.

With a light stress on the rope, put on the clip nearest to the thimble next. When more than two clips are used, space them between these two.

After the rope has been broken in, all nuts should be *tightened* again to make sure they are holding.



Safe-Line Rope Clamps

The "Safe-Line" clamp consists of four easily assembled parts, and may be used with or without a thimble. Only one clamp is required for each fastening.

The two taper threaded sections, which are placed on the exposed sides of the wire rope, are *squeezed* together in a *vise-like grip* when the two taper nuts are tightened.

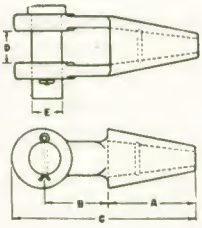
They grip the rope with a strength actually greater than that of the rope itself. Forged from high tensile alloy steel, they are available in plain forged finish or cadmium plated.

Rope Size Inches	Length Inches	Width Inches	Approximate Weight	Rope Size Inches	Length Inches	Width Inches	Approximate Weight
1/16	1 5/32	1/2	1 oz.	5/16	2 3/4	1 1/4	14 oz.
3/32	1 5/32	1/2	1 oz.	3/8	3 1/4	1 3/8	1 lb., 2 oz.
1/8	1 3/4	5/8	2 oz.	7/16	3 5/8	1 5/8	1 lb., 12 oz.
5/32	1 3/4	5/8	2 oz.	1/2	4	1 7/8	2 lbs., 8 oz.
3/16	2 1/4	13/16	5 oz.	5/8	4 5/8	2 1/4	4 lbs.
7/32	2 1/4	13/16	5 oz.	3/4	5 3/4	2 5/8	6 lbs., 8 oz.
1/4	2 1/2	1	8 oz.				

WIRE ROPE SOCKETS—OPEN PATTERN

DROP FORGED STEEL

For Rope Diameter in Inches	Dimensions in Inches					Estimated Weight Each in Pounds
	A	B	C	D	E	
1/4	2	1 9/16	4 5/16	11/16	11/16	.8
5/16-3/8	2	1 3/4	4 5/8	13/16	13/16	1.4
7/16-1/2	2 1/2	2	5 9/16	1	1	2.3
9/16-5/8	3	2 1/2	6 3/4	1 1/4	1 3/16	4.2
3/4	3 1/2	3	7 15/16	1 1/2	1 3/8	6.6
7/8	4	3 1/2	9 1/4	1 3/4	1 5/8	10.
1	4 1/2	4	10 9/16	2	2	15.2
1 1/8	5	4 1/2	11 13/16	2 1/4	2 1/4	22.
1 1/4	5 1/2	5	13 3/16	2 1/2	2 1/2	34.
1 3/8	5 1/2	5	13 3/16	2 1/2	2 1/2	34.
1 1/2	6	6	15 1/8	3	2 3/4	46.
1 5/8	6 1/2	6 1/2	16 1/4	3	3	55.
1 3/4	7 1/2	7	18 1/4	3 1/2	3 1/2	82.
1 7/8	7 1/2	7	18 1/4	3 1/2	3 1/2	82.
2-2 1/8	8 1/2	9	21 1/2	4	3 3/4	125.
2 1/4-2 3/8	9	10	23 1/2	4 1/2	4 1/4	160.



SPELTER GROOVES

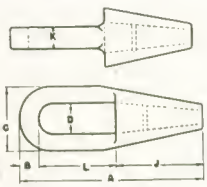
Size of Socket in Inches	Number of Grooves	Approx. Depth Inches
1/4 to 3/4	1	1/16
7/8 to 1 1/2	2	1/8
1 5/8 to 2 1/4	3	3/16

Dimensions of sockets conform to Wire Rope and Strand Manufacturers' Association specifications adopted July, 1941

WIRE ROPE SOCKETS—CLOSED PATTERN

DROP FORGED STEEL

For Rope Diameter in Inches	Dimensions in Inches							Est. Wt. Each in Lbs.
	A	B	C	D	J	K	L	
1/4	4 1/4	7/16	1 3/4	13/16	2	1/2	1 13/16	.6
5/16-3/8	4 5/8	9/16	1 15/16	15/16	2	5/8	2 1/16	1.
7/16-1/2	5 1/2	11/16	2 1/4	1 1/8	2 1/2	7/8	2 15/16	1.7
9/16-5/8	6 3/8	13/16	2 13/16	1 3/8	3	1	2 9/16	3.6
3/4	7 5/8	1 1/16	3 1/4	1 5/8	3 1/2	1 1/4	3 1/16	5.2
7/8	8 7/8	1 1/4	3 5/8	1 7/8	4	1 1/2	3 5/8	7.9
1	10	1 3/8	4 1/8	2 1/4	4 1/2	1 3/4	4 1/8	12.2
1 1/8	11 1/8	1 1/2	4 5/8	2 1/2	5	2	4 5/8	15.5
1 1/4	12 5/16	1 5/8	5 1/8	2 3/4	5 1/2	2 1/4	5 3/16	22.5
1 3/8	12 5/16	1 5/8	5 1/8	2 3/4	5 1/2	2 1/4	5 3/16	22.5
1 1/2	14 1/8	1 15/16	5 3/8	3 1/8	6	2 1/2	6 3/16	31.
1 5/8	15 3/8	2 1/8	5 3/4	3 1/4	6 1/2	2 3/4	6 3/4	36.
1 3/4	17 1/2	2 3/16	6 3/4	3 17/32	7 1/2	3	7 13/16	58.
1 7/8	17 1/2	2 3/16	6 3/4	3 17/32	7 1/2	3	7 13/16	58.
2-2 1/8	19 3/4	2 7/16	7 5/8	3 25/32	8 1/2	3 1/4	8 13/16	80.
2 1/4-2 3/8	21 5/8	2 7/8	8 1/2	4 9/32	9	3 5/8	9 3/4	105.



SPELTER GROOVES

Size of Socket in Inches	Number of Grooves	Approx. Depth in Inches
1/4 to 3/4	1	1/16
7/8 to 1 1/2	2	1/8
1 5/8 to 2 1/4	3	3/16

Dimensions of sockets conform to Wire Rope and Strand Manufacturers' Association specifications adopted July, 1941

OPEN WEDGE SOCKETS

CAST STEEL

For Rope Diameter in Inches	Diameter of Pin Hole in Inches	Width Between Jaws in Inches	Width Outside Jaws in Inches	Weight Each in Pounds
3/8	1 1/16	5/8	1 1/8	2 1/2
1/2	1 1/16	5/8	1 1/8	2 1/2
5/8	1 1/4	1 3/8	2 1/8	5
3/4	1 1/4	1 1/4	2 1/8	9
7/8	1 5/8	1 3/4	2 3/4	15
1	1 5/8	1 5/8	2 3/4	20

Pins are not furnished.
Prices furnished on application.

Both open and closed sockets are made for tough service. They are made of drop forged steel. Open wedge sockets are made of cast steel.

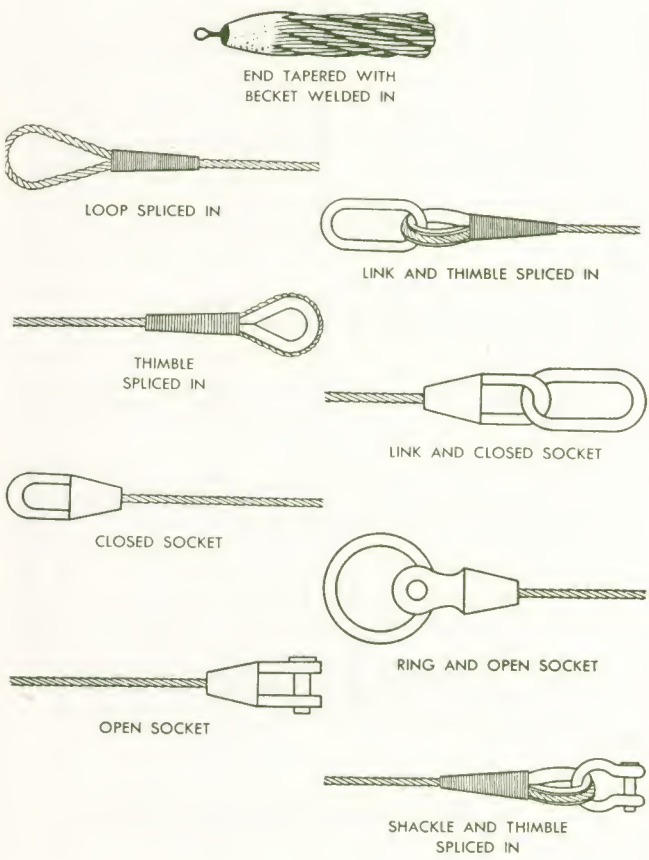
In each of these sockets, the strength is more than ample to develop the full strength of the rope.

They can be furnished attached to the rope by experts at our wire rope division to insure maximum service.

Typical Terminals

Here are some of the various combinations of fittings and terminals on wire rope, which are available. J&L engineers will gladly assist you in designing slings and rope terminals to meet your job requirements.

TYPICAL TERMINALS



Grommet Loops

A Grommet, or endless wire rope sling, is hand made from a single continuous strand.

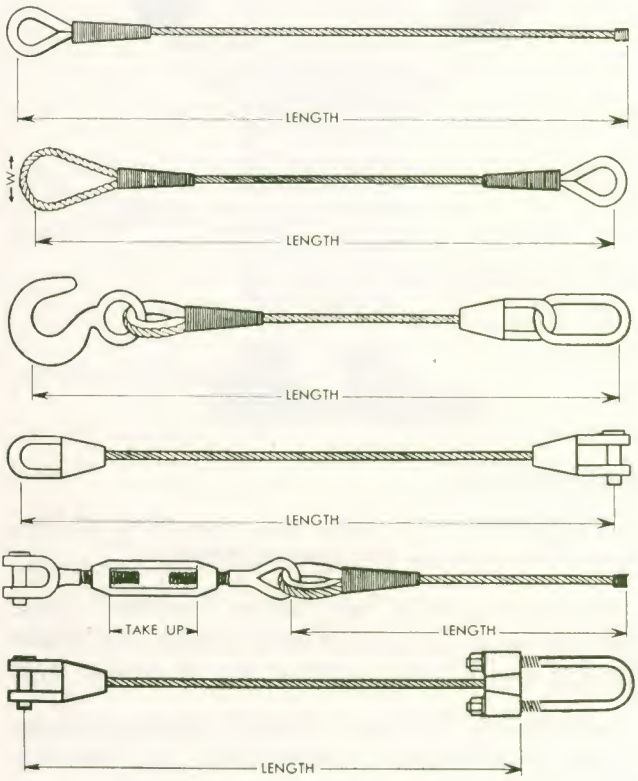
Stronger than the conventional "endless" splice, the Grommet has good holding power and tensile strength nearly equal to that of a six strand rope.

In ordering Grommets, specify the loop circumference, rope diameter, grade of wire, and construction of the strand.

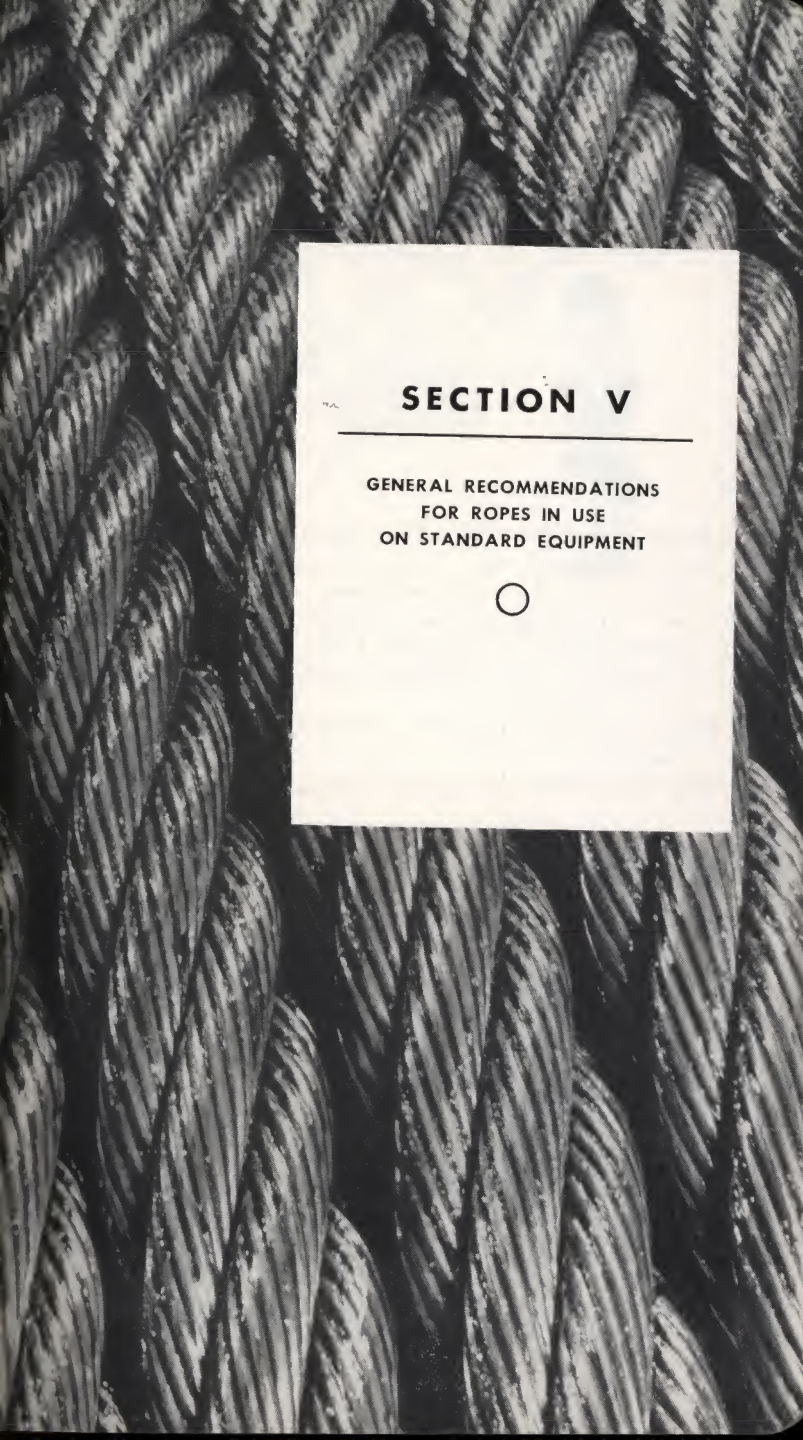
Nineteen wire and thirty-seven wire strand Grommets are the most popular, in improved plow steel grade.

Measuring Slings

Here are some drawings which show how to measure the lengths of different types of slings. With the exception of slings with loops or bridge sockets, the length is taken from *bearing to bearing.*



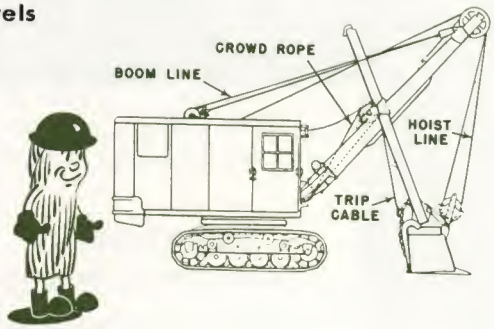
It is always best to *give* a *rough sketch* with inquiries and orders involving fittings and services.



SECTION V

GENERAL RECOMMENDATIONS
FOR ROPES IN USE
ON STANDARD EQUIPMENT

Shovels



Boom Line—6x19, "W", I.P.S., I.W.R.C., Reg. Lay

Hoist Line—6x19, "W", I.P.S., Permaset, I.W.R.C., Lang Lay (on ⅝ yd. to 4 yd. machines)

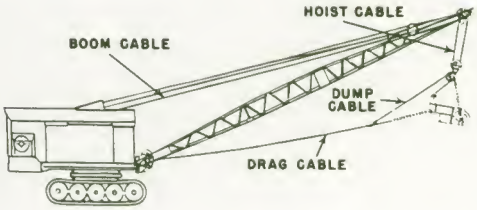
6x37 "D" I.P.S. Permaset, I.W.R.C., Lang Lay (on machines under ⅝ yd. and over 4 yd.)

or 8x19W, I.P.S., Permaset, CenterFit, Lang Lay up to 1⅛" diameter

Crowd and Retract—6x37 "D", I.P.S., Permaset, I.W.R.C., Lang Lay

Trip Cable—6x37, "D", I.P.S., Permaset, H.C., Reg. Lay

Dragline Excavator



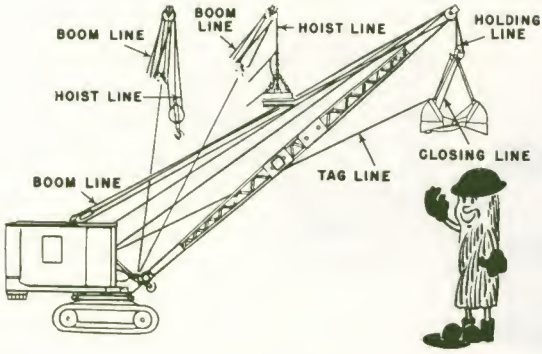
Boom Cable—6x19, "W", I.P.S., I.W.R.C., Reg. Lay

Hoist Cable—6x19, "W", I.P.S., Permaset, I.W.R.C., Lang Lay

Drag Cable—6x19, "U", I.P.S., I.W.R.C., Lang Lay

Dump Cable—6x19, "W", I.P.S., I.W.R.C., Permaset, Lang Lay

Crane



Boom Line—6x19, "W", I.P.S., H.C., Reg. Lay

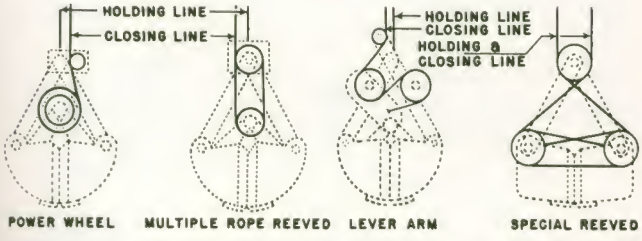
Holding Line–8x19W, I.P.S., Permaset, CenterFit, I.W.R.C., Reg. Lay

Closing Line—8x19W, I.P.S., Permaset, CenterFit, I.W.R.C., Reg. Lay

Hoist Line—8x19W, I.P.S., Permaset, CenterFit, I.W.R.C., Reg. Lay

Tag Line—6x37, I.P.S., Permaset, H.C., Reg. Lay

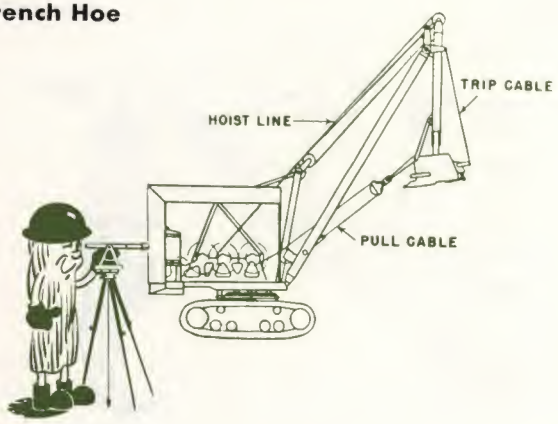
Grab Buckets



Power Wheel and Lever Arm Buckets—6x19, "W", I.P.S., Permaset, H.C., Reg. Lay

Multiple Rope and Special Reeved Buckets—8x19, "W", I.P.S., Permaset, CenterFit, I.W.R.C., Reg. Lay

Trench Hoe

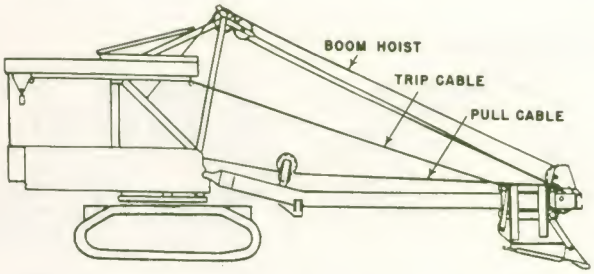


Pull Cable—6x37, "D", I.P.S., Permaset, I.W.R.C., Lang Lay

Hoist Line—6x37, "D", I.P.S., Permaset, I.W.R.C., Lang Lay

Trip Cable—6x37, "D", I.P.S., Permaset, H.C., Reg. Lay

Skimmer

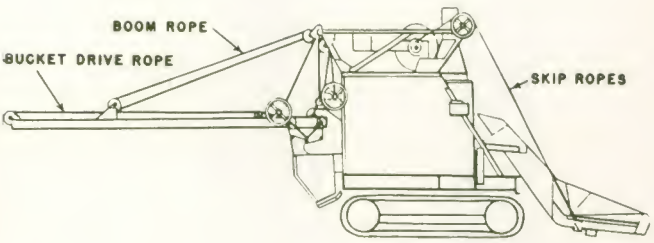


Boom Hoist—6x19, "W", I.P.S., Permaset, I.W.R.C., Reg. Lay

Pull Cable—6x19, "W", I.P.S., Permaset, I.W.R.C., Lang Lay

Trip Cable—6x37, I.P.S., Permaset, H.C., Reg. Lay

Paver

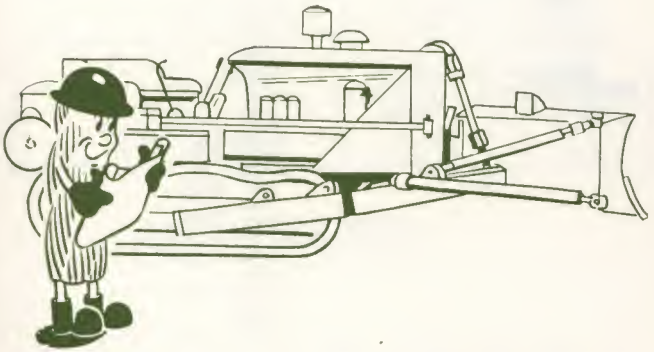


Boom Rope—6x19, "W", I.P.S., Permaset, I.W.R.C., Reg. Lay

Bucket Drive—6x37, I.P.S., Permaset, H.C., Reg. Lay

Skip Ropes—6x37, I.P.S., Permaset, H.C., Reg. Lay

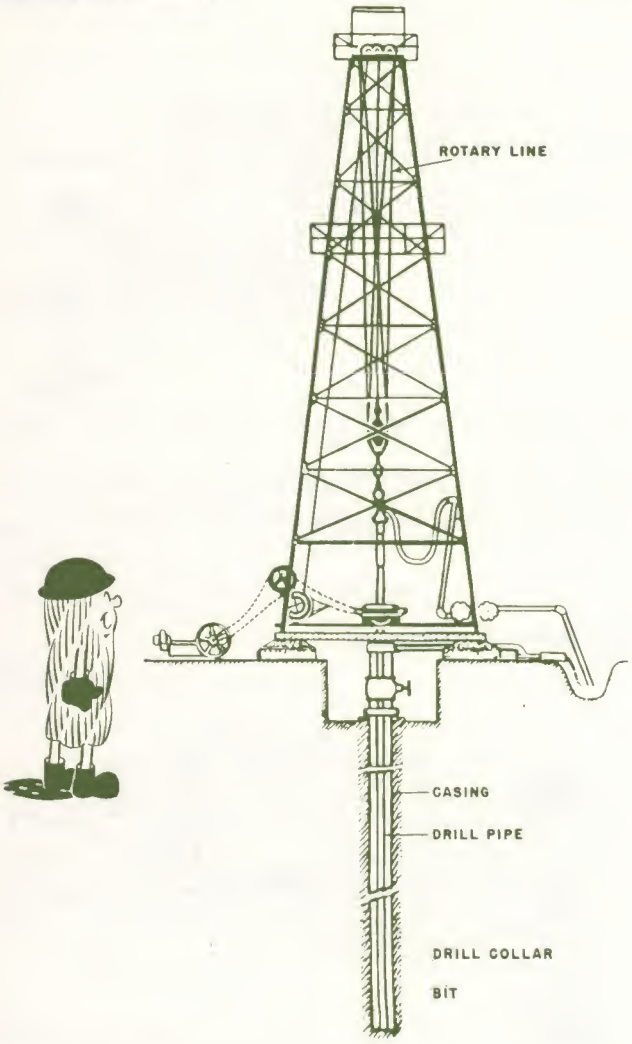
Scraper and Bulldozer



6x19, "W", I.P.S., Permaset, I.W.R.C., Lang Lay

8x19W, I.P.S., Permaset, CenterFit, I.W.R.C., Lang Lay

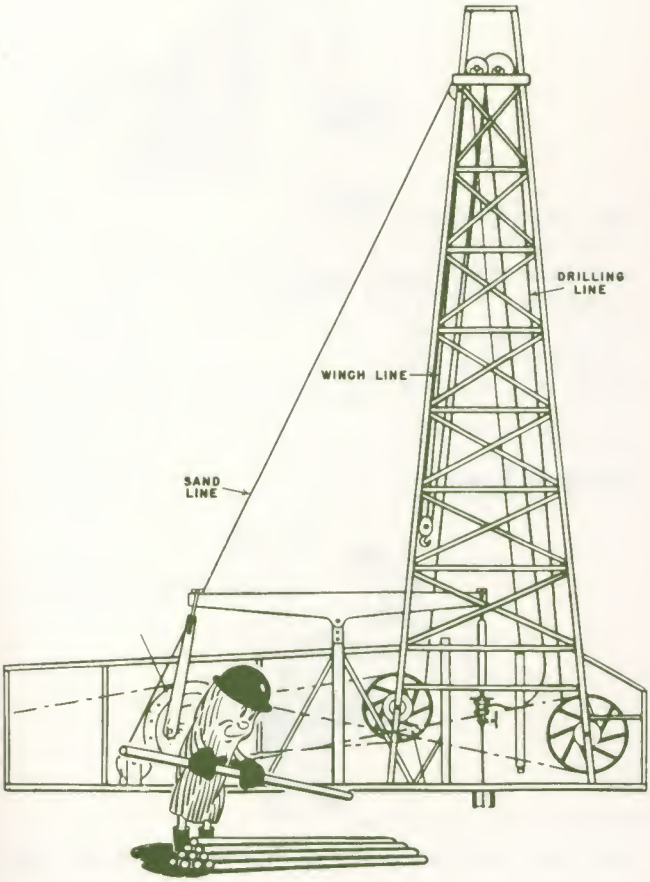
Rotary Drill Lines



6x19, S.P., I.P.S., Permaset, H.C. or I.W.R.C., Reg. Lay

Sucker Rod and Tubing Lines—18x7, P.S. and I.P.S., Permaset, H.C., Reg. Lay

Cable Tool Drill Lines

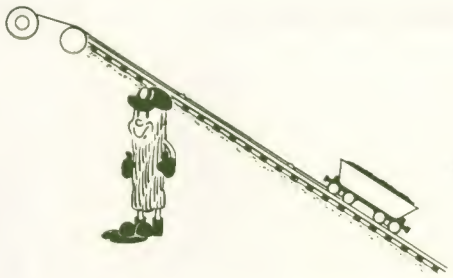


6x19, "U", M.P.S., H.C., Left or Right Reg. Lay

Sand Line—6x7, M.P.S. and P.S., H.C., Right Reg. Lay

Winch Line—6x19, "W", I.P.S., Permaset, I.W.R.C., Reg. Lay

Mine Ropes



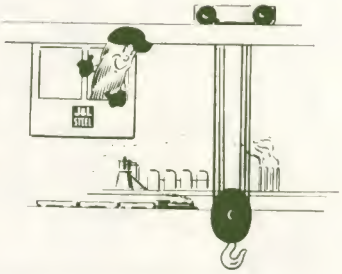
Slope Haulage Rope—6x19, S.P., P.S., Permaset, H.C., Reg. Lay

Shaft Hoist Ropes—6x19, "W", I.P.S., H.C., Reg. Lay or Lang Lay

Mining Machine—6x37, "D", P.S., Permaset, H.C. or I.W.R.C., Reg. Lay

Slusher Rope—3x19, S.P., P.S., Reg. Lay

Industrial Ropes



Overhead Cranes and Hoists

¼″ to 7/16″ 6x19, I.P.S. or P.S., Permaset, H.C., Reg. Lay

½″ and larger, 6x37, "D", P.S. or I.P.S., Permaset, H.C., Reg. Lay

or 8x19W, I.P.S., Permaset, CenterFit, I.W.R.C., Reg. Lay

Ladle Cranes—6x37, I.P.S., I.W.R.C., Reg. Lay

Gantry Crane—6x19, "W", I.P.S., Permaset, H.C., Reg. Lay or 8x19W, I.P.S., Permaset, CenterFit, I.W.R.C., Reg. Lay

Marine Ropes

Hawsers—6x37, G.I.P.S., H.C., Reg. Lay or Spring Lay Permaset

Mooring Lines—6x12 and 6x24, G.I.P.S., H.C., Reg. Lay

Steering Ropes—6x42, Galvanized Iron, H.C., Reg. Lay

Cargo Falls—6x37, P.S., Permaset, H.C., Reg. Lay

Logging Industry Ropes

Main or Bull Line—6x19, S.P., P.S., I.W.R.C., Reg. Lay

Haul-Back or Tail Line—6x19, S.P., P.S., H.C., Reg. Lay

Choker Line—6x19, "W", I.P.S., I.W.R.C., Reg. Lay

Guy Lines—6x19, S.P., P.S., H.C., Reg. Lay

Loader Line—6x19, "W", I.P.S., Permaset, I.W.R.C., Reg. Lay

Winch Line—6x19, "W", I.P.S., Permaset, I.W.R.C., Reg. Lay

J&L WIRE ROPE

Jones & Laughlin Steel Corporation

J&L is the fourth largest steel-maker in the nation.

Its far flung operations spread from the iron ore ranges in Minnesota and New York, to the coal mines and limestone quarries in Pennsylvania and West Virginia.

Huge J&L steel making centers are located in Pittsburgh and Aliquippa, Pa., and in Cleveland, Ohio. Additional fabricating plants are situated throughout the United States.

Hundreds of thousands of tons of steel and steel products made by J&L annually are used in all phases of American home and business life and some reach the far countries of the earth.

A general list of principal products is:

HOT ROLLED AND COLD FINISHED BARS AND SHAPES

HOT AND COLD ROLLED STRIP AND SHEETS

STRUCTURALS

TUBULAR PRODUCTS

WIRE MILL PRODUCTS

TIN MILL PRODUCTS

OTISCOLOY AND JALLOY HI-TENSILE STEELS

PRECISIONBILT WIRE ROPE

COAL CHEMICALS


WIRE ROPE
J&L
J&L WIRE RO
J&L
STEEL